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ABSTRACT

This instructor's guide contains the materials required to teach a competency-based introductory course in bricklaying to students who have chosen to explore careers in construction. The following topics are covered in the course's three instructional units: bricklaying materials, bricklaying tools, and applied skills. Each unit contains some or all of the following: objective sheets, suggested activities, supplemental information/activities to be presented at the instructor's discretion, information sheets, sheets of supplementary information to assist students in solving problems, transparency masters, instructional supplements containing suggestions for teaching basic skills, assignment sheets, job sheets, practical tests, written tests, and answers to assignment sheets and tests. Academic skills training is combined with vocational training throughout the instructional materials, and a system of icons has been used to help instructors identify activities into which training in the following basic skill areas has been infused: reading, science, creative thinking/problem solving, writing, oral communication, employability, math, interpersonal skills, and social studies. Most units of instruction are designed for use in more than one lesson or class period of instruction. These materials precede the instructional units: information on basic skills in curriculum, information on measuring student performance gains, and required criteria for a competency-based education program. A competency profile and basic skills matrix are included. (MN)

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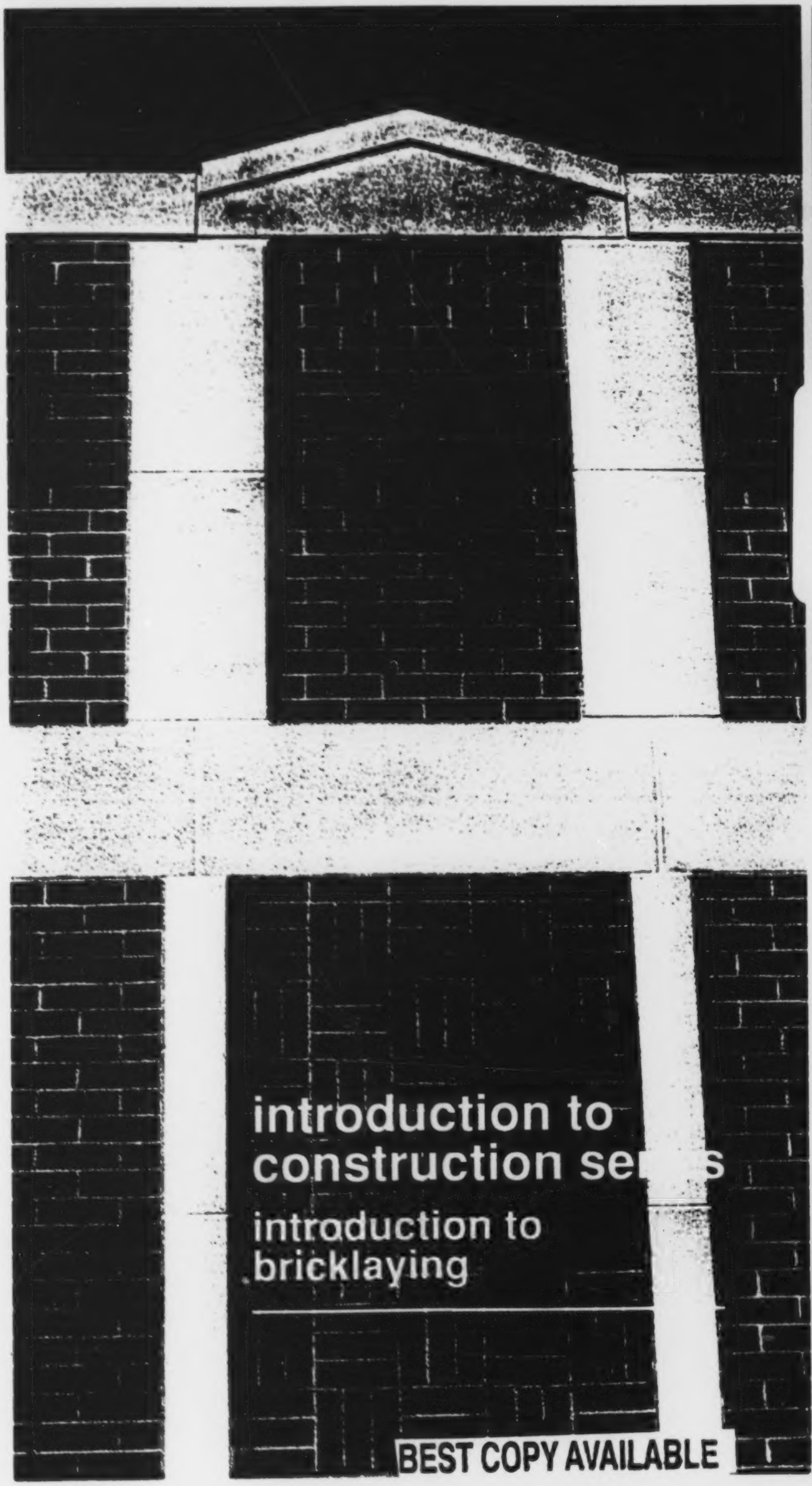

introduction to construction series

introduction to bricklaying

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Introduction To Bricklaying

Developed as a Cooperative Project by
the Associated General Contractors of America
William W. Brown, Chairman, Manpower and Training Committee
and
Curriculum and Instructional Materials Center,
Oklahoma Department of Vocational and Technical Education

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Introduction To Bricklaying

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FOREWORD

In 1985, The Associated General Contractors of America (AGC) met with representatives of the Oklahoma Curriculum and Instructional Materials Center (CIMC) to discuss the possibilities of developing, as a cooperative project a course of instruction designed for training individuals who choose to seriously explore careers in bricklaying.

This revised publication is the result of those original discussions and updates made through close coordination among general contractors and vocational educators. This series represents conscious effort to coordinate the practical experience of personnel in the bricklaying industry with the best instructional methods of those in the field of vocational education.

Although this book reflects a systematic approach to instructional materials development and the latest in educational technology innovations, the information in the Introduction To Bricklaying manual should be adapted and modified to coincide with local conditions.

Roy Peters, Jr.
State Director
Oklahoma Department of Vocational
and Technical Education

William. W. Brown, Chairman
Manpower and Training Committee
The Associated General Contractors
of America

PREFACE

Bricklaying requires that students have many skills and related information to become productive workers in this challenging field. Workers must be better trained and equipped to find and retain meaningful employment.

Instructional materials in this manual is written in terms of student performance, using measurable behavioral learning process. Criterion-referenced evaluation instrument provide for a uniform measurement of student progress.

The purpose of this manual is to assist instructors in all bricklaying related areas in providing instruction throughout the industry. Any information in this manual that does not concur with the instructor's course of study should be modified to meet personal needs.

Personnel safety is of prime concern, as an instructor you are encouraged to closely observe and couch students in all safety issues. We have done much to advise students of possible dangers, but your close supervision and alertness can't be overemphasized.

Al Willey
Curriculum and Instructional
Materials Center
Oklahoma Department of Vocational
and Technical Education

ACKNOWLEDGEMENTS

Much appreciation is expressed to the many individuals who contributed their time, talents, and knowledge in the revision of this manual.

Thank you to the following ad hoc committee members, AGC staff representatives, and the staff of the Oklahoma Department of Vocational and Technical Education.

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USE OF THIS PUBLICATION
INSTRUCTIONAL UNIT

Introduction to Bricklaying contains three units. Each instructional unit includes some or all of the basic components of a unit of instruction: performance objectives, suggested activities for the instructor, extensions and options, information sheets, students supplements, transparency masters, instructional supplements, assignment sheets, job sheets, practical tests, written test, and answers to assignment sheets and written test, all of which are included in the instructor's edition. The student workbook includes the objective sheets, information sheets, student supplements, transparency masters, assignment sheets, and job sheets. Written tests may be duplicated for classroom use or *additional copies* may be purchased by calling 1-800-654-4502 or, in Oklahoma, 1-800-522-5810, ext. 589.

All of the unit components tie into measurable and observable learning outcomes. Instructors are encouraged to supplement these components with other resources in order to make them as responsive to local conditions and individual needs as possible.

Most units of instruction are designed for use in more than one lesson or class period of instruction. Careful study of each unit of instruction by the instructor will help him or her determine the following:

- Amount of material that can be covered in each class period.
- Skills that must be demonstrated.
    - Supplies and equipment needed
    - Amount of class time needed for demonstrations
    - Amount of time needed for student practice
- Supplementary materials, including print and non-print media, that must be ordered.
- Resource people who must be contacted.

Objective Sheet (White Pages)

Each unit of instruction is based on the performance needed for successful employment in an occupational area. Performance objectives are stated in two forms. The unit objectives states the overall goal of the unit. It tells what the student should be able to do and what standard will be used to see whether the student can do it. Specific objectives outline the teaching sequence of the competencies required to meet the unit objective.

The objectives should be provided for students and stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objectives can also help determine teaching strategies and instructional methods. Instructors should prepare for each unit by deciding how each objective could be best taught.

Instructors should feel free to modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are added, the instructor should remember to supply the needed information, assignment and/or job sheets, and criterion-referenced test items.

Suggested Activities (Pink Pages) – **Instructor's Edition only**

The suggested activities page assists the instructor during the preparation stage of the teaching/learning process by providing suggestions for delivery, application, and evaluation during the instructional process. The instructor should read the suggested activities prior to introducing the unit to allow time to obtain supplemental materials, prepare audiovisual materials, and contact outside resources. Duties of the instructor will vary according to the particular unit.

References used in the development of each unit are listed in the "Suggested Resources" section, along with print and non-print media that may be used to teach the unit. These materials can be used by the instructor to supplement his or her knowledge of the subject area or to help students with particular interests or occupational objectives in the area covered.

Extensions and Options (White Pages) – **Instructor's Edition only**

Extensions and Options are supplemental material that is not testable or graded and is nice-to-know. Extensions and Options provide the instructor with additional activities, fact sheets, art, controversial items, and extra practice sheets. They may also include items for the gifted or remedial student. Extensions and Options are used at the discretion of the instructor.

Information Sheets (Green Pages)

The information sheet provides "must know" content essential for meeting the cognitive objectives stated at the beginning of each unit. It serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective.

Students should read the information sheet before it is discussed in class. Space is provided in margins for students and instructors to add notes that clarify and/or expand on the information provided.

The information sheet may include notes, cautions, or warnings. These should be discussed carefully and thoroughly. **Notes** are short verbal additions to the information sheet or procedural outline that provide nice-to-know and decision-making information. A note may tell the student what to watch for or to consider at a given step. It may explain when a step may not be applicable. Notes offer guidance that may help the student understand the process and do it more efficiently. **Cautions** are advisories that tell the student how to avoid causing minor personal injury or equipment damage. **Warnings** are advisories to the student used to avoid serious personal injury or death to the student, persons in the workplace, or users of the project or the procedure.

Student Supplement (Green Pages)

Student supplements include instructions that could be used for solving problems or reinforcing the enrichment of learning. The information presented in a student supplement may consist of tables, charts, written information, forms, or other information students will need in order to complete one or more of the assignment or job sheets. While supplements are not tested over directly, they may be used to assist in meeting the performance objectives.

Transparency Masters (White Pages) - **Instructor's Edition only**

Transparency masters provide information in a special way. The students may see as well as hear the materials being presented, thus reinforcing the learning process. Transparencies may present new information or they may reinforce information presented in the information or assignment sheets.

Transparencies should be made and placed in the notebook where they will be immediately available for use. Transparencies direct the class's attention to the topic of discussion. They should be left on the screen only when topics shown are under discussion.

Instructional Supplements (Pink Pages) — **Instructor's Edition only**

Instructional Supplements provide suggestions for teaching the basic skills included in each assignment sheet or job sheet. They are located directly in front of the components they support–assignment or job sheets–in each unit.

Assignment Sheets (Tan Pages)

Assignment sheets provide students with information and exercises that address learning levels at or above the application level of Bloom's taxonomy. Assignment sheets provide written exercises for instruction and practice of a specific objective. The introduction to the assignment sheet explains how the assignment sheet relates to the subject area and unit component for such information.

Assignment Sheet Answers (Pink Pages) – **Instructor's Edition only**

This component is designed to assist the instructor in evaluating student performance on assignment sheets.

Job Sheet (Blue Pages)

Job Sheets are another important segment of a unit of instruction. The job sheets provide a list of equipment, tools, and materials needed to complete a manipulative or psychomotor skill. They describe a step-by-step procedure to complete each task or job. Diagrams, photographs, and illustration are provided to assist students in achieving the skill.

The instructor should demonstrate the procedure outlined in each job sheet. Furthermore, the instructor needs to localize the procedure according to the equipment and supplies available in the local lab or salon situation. Job sheets also furnish potential employers with a picture of the skills being taught and the performances they might reasonably expect from a person who has had this vocational instruction.

Practical Tests (Yellow Pages) – **Instructor's Edition only**

The practical tests are designed to assist the instructor in the evaluation of the psychomotor activities (job sheets). The practical test provides instructors with a valid mechanism for determining a student's level of ability in performing the procedure stated on the job sheet. The check-off list allows instructors to evaluate a student's process performance of the task on the job sheet. The overall competency indicator allows the instructor to evaluate the end product.

Written Test (Yellow Pages) – **Instructor's Edition only**

This component provides criterion-referenced evaluation of every objective listed in the unit of instruction. If objectives have been added, deleted, or modified, appropriate changes should be made on the test.

In order to measure and document student competency gains as required by the latest Carl Perkins regulations, and as outlined in the Oklahoma-developed system of standards and measures, it is *absolutely essential* that the same test be used as a pretest and as a posttest. If you choose to use tests other than the ones included herein, be sure that the same instrument is used for each activity–pre- and post test.

A detailed explanation of the Oklahoma plan for standards and measures and the Carl Perkins requirements is included in the CIMC publication, *Measuring Learning & Competency Gain: The Pretest/Posttest Approach*. This booklet and accompanying software designed to assist in calculating and recording student gains are available to all vocational teachers through the school's vocational testing liaison.

To further assist vocational teachers, the CIMC is in the process of developing test code sheets for each written test in its more recent publications, including this one. These code sheets are explained in Section 8 of the publication mentioned above, and will greatly assist in verifying that the test is a valid instrument for measuring student learning and competency gains. As the test code sheets for programs become available, they will be forwarded to teachers of each program; further publications will include the test code sheets.

Written Test Answers (Pink Pages) – **Instructor's Edition only**

This component is designed to assist the instructor in evaluating student performance on written tests.

COMPETENCY PROFILES

A competency profile is available from CIMC Resale for each publication. Competency profiles document student performance. The profile contains a list of the specific job competencies that a student should achieve before leaving the training program.

PAGE NUMBERING

Each publication for the Curriculum and Instructional Materials Center is usually assigned a specific abbreviation. ***Introduction to Bricklaying*** has not been abbreviated. Each unit will be recognized by the unit number in Arabic numerals. Each unit in the publication begins with page 1. Each page number gives the component name, book title, unit number, and page number within the unit. Since some CIMC publications are loose-leaf, this system of page numbering was recently adopted so that pages from different manuals would not get mixed up. The page number for the objective sheet in Introduction to Bricklaying, which is unit 2, would look like this:

OBJECTIVE SHEET - **Introduction to Bricklaying**
CIMC - A2 - 1

METHODS OF DISSEMINATING MATERIAL

For best results, provide student materials for each student. Student workbooks contain objective sheets, information sheets, supplements, transparency masters, assignment sheets, and job sheets. Pretest, practical tests, and written tests are packaged separately for students, and can be stored until needed. Students should be allowed to take their materials home at the end of the course.

TEACHING METHODS

Keeping students motivated is a challenge. Supplement the objectives by providing the "why," personal experiences, and current information. If you are going to teach the material in a group setting, prepare for the unit be deciding the best way to teach each objective and allow for student input.

If you are going to follow the plan for individualized instruction, provide opportunities that will allow each student to become involved in planning for and being responsible for his or her own education.

CORRECTIONS AND SUGGESTIONS

The Curriculum and Instructional Materials Center (CIMC) wants to provide vocational instructors and students with materials that are accurate and effective. Although the CIMC strives to maintain the highest standards of development and production, oversights occasionally do occur. If you find any errors in this or other CIMC publications, or have suggestions for improving their usefulness in vocational programs, please notify the CIMC staff. One easy way of pointing out errors is to make a photocopy of the affected page and to indicate the correction on the copy. Mail this information to the CIMC, where it will be used to correct the publication before the materials are reprinted.

To ensure that the material is updated on a timely basis, notify the CIMC of necessary corrections as soon as possible after discovering the error. Do not assume that someone else will notice the error and inform the CIMC; other users may be making the same assumption. Please send corrections and recommendations for improving this publication to the following address:

Coordinator of Development
Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and
Technical Education
1500 West Seventh Avenue
Stillwater, Oklahoma 74074-4364

For a free catalog, a list of new publications, or other instructional materials information call 1-800-522-5810, extension 589.

RESALE

BASIC SKILLS IN CURRICULUM

The CIMC has always been mindful of the importance of reinforcement (and sometimes remediation) of students' academic skills as they progress through vocational training, and has always included activities in its materials to enhance and promote use of these skills.

Recent state and federal legislation mandates vigorous basic skills development in vocational education in the wake of demands by industry that workers *must* be academically, as well as technically, competent, given the nature of the highly complex work place. In response, the CIMC has taken the following steps to document that, indeed, the instructional materials *do* combine academic skills training with the vocational training. In addition, concerted efforts have been made to "beef up," or enhance the basic skills instruction already present. Following is a brief description of those processes:

Basic Skills Icons and Enablers

To assist teachers and students in identifying activities that promote basic skills development, the CIMC has implemented a marking system that uses simple graphic symbols, or icons, and a list of specific tasks, or enablers, to identify the basic skill or skills that are called for in each job or assignment sheet.

Each of the nine broad skills areas–reading, writing, mathematics, science, oral communication, interpersonal or relating, creative thinking and problem solving, employability, and social studies–is represented by the icon presented below.

Reading

Science

Creative Thinking/ Problem Solving

Writing

Oral Communication

Employability

Math

Interpersonal or Relating

Social Studies

When an activity involving one of these basic skills is identified, the corresponding icon is placed in the left-hand margin of the job or assignment sheet. The basic skills training is further defined by retrieving the specific, or enabling, skill that is required by consulting a list of over two hundred and fifty enablers that has been compiled and grouped with each general basic skill. This enabling skill is placed directly below the icon.

As an example, an exercise that requires a student to conduct library research would make necessary the use of specific reading comprehension and research and reference skills. The basic skills that the exercise promotes would be depicted in the left-hand margin as follows:

ASSIGNMENT SHEET

PLANNING LIVING SPACE FOR HUMAN NEEDS

1

Name ______________________ Score __________

OBJECTIVE 10 **Define personal territory.**

INSTRUCTIONS

Reading Comprehension
- Gain factual information

Functional Reading
- Follow written instructions
- Use content area vocabulary

Language
- Use standard grammar, spelling, and capitalization
- State ideas clearly

- As discussed in Objective 1, each person has an invisible "space bubble" or comfort zone. A comfort zone is the space between oneself and others that brings a feeling of well-being. When one's comfort zone is crowded or invaded, discomfort often results. Therefore, personal territory needs should be a prime consideration when planning living space.
- For each of the following situations, draw your estimated comfort zone around the figures provided.
- Indicate how many inches from your body the comfort zone extends.
- Consider how that comfort zone changes in different situations. Answer the questions that follow.

Basic Skills Documentation Matrix

Another component of the CIMC basic skills instructional plan is the "Basic Skills Documentation Matrix." The matrix graphically summarizes the basic skills training included in the vocational program, unit by unit. It should be helpful to teachers in planning their instruction, and to administrators as documentation that basic skills **are** being addressed during the vocational training.

The matrix for this publication is included as an 8½" by 11" foldout in this *Instructor's Manual*.

Matrices have been developed for most CIMC publications. For more information on those available for other programs, call the CIMC at 1-800-654-4502.

Instructional Supplement

The supplement is a tool for the instructor to use in helping students apply the basic skills in Assignment Sheets and Job Sheets. Some supplements are appropriate for use with all students; some are for use only with those students who do not understand the academic skills called for in the exercise.

MEASURING STUDENT PERFORMANCE GAINS

When you examine this book, you will notice that separate written pretests are no longer included in the units of instruction. Each CIMC unit now contains only a single Written Test. This test should be used as **both** pretest and posttest by giving it once before students start a unit and again when they have completed the unit.

The reason for using a single instrument as both pretest and posttest is so that direct comparison of each student's competencies before and after instruction can be made accurately. This comparison enables precise calculation, documentation, and evaluation of student **performance gains**.

Accurate performance gains analysis is an important requirement of the new Carl Perkins legislation for vocational education. Teachers can make an important contribution to the performance accountability mandated by the new federal legislation by carrying out accurate performance gains analysis for their students, and making this data available to students, parents, and administrators.

This analysis is easy to do and requires only simple calculations and record keeping. Detailed information regarding performance gains analysis is contained in the CIMC publication, *Measuring Learning & Competency Gains: The Pretest/Posttest Approach*. In addition, the CIMC has developed a computer program, CARL, which will perform all necessary calculations and will print out a record form of all information required for gain score analysis. Copies of CARL and the publication are available through your local testing liaison (in Oklahoma), or from the CIMC at 1-800-654-4502.

REQUIRED CRITERIA FOR A COMPETENCY-BASED EDUCATION PROGRAM

Criterion	**Discussion**	**CIMC component meeting criterion**
1. Instruction is based on clearly-stated learning objectives that are: a) observable and measurable, and b) communicated in writing to students before instruction begins.	Learning objectives drive CBE. Objectives are the "competencies" that learners must achieve. Each objective must clearly state what *learners* must *do* to demonstrate acquired skill or knowledge. Verbs in learning objectives are active and precise, stating the exact performance expected of learners. The objectives should also specify the standard or level of performance required. Objectives can be at any level of Bloom's Taxonomy and can include the cognitive, psychomotor, and affective domains. Higher-order cognitive skills should be included.	Objective Sheet
2. Instruction is aligned with the stated learning objectives	In CBE, the objectives specify what is taught. "Content" should relate to one or more objectives. The curriculum should cover all objectives with relevant information.	Information Sheet
3. There is a student evaluation system that is: a) criterion-referenced, and b) aligned to the learning objectives and the curriculum.	In CBE, the aim is to bring the performance of *all* learners up to a pre-defined standards and competencies. Learners work on each competency until they achieve "mastery"; the evaluation system should test and record this mastery. Learners can restudy and retest as often as needed. Specific remediation activities should also be available to learners when needed. The evaluation system focuses on what each student has achieved, not on what the instructor has "taught." The "constant" in CBE is student performance; the "variables" are time and resources. (This differs from traditional systems where learners get one chance at mastery; some succeed and some fail. In such systems, time and resources are constant and student achievement is variable.) If an evaluation is criterion-referenced, successful learner performance is defined by (or *referenced* to) mastery of pre-set objectives and standards (or *criteria*): there must be a careful match (or *alignment*) between what the student should master (objectives), what is taught (curriculum), and what is tested. Objectives, curriculum, and evaluation system must all match.	Written Test and Job Sheet/Skill Test

Criterion	Discussion	CIMC component meeting criterion
4. There is an observable management system of cognitive skill practice that provides for, promotes, and documents mastery learning.	For both cognitive and psychomotor skills, a CBE program must have a system of maintaining records of which skills and activities each learner has completed, which ones are in progress, and which ones have not yet been completed. Completion means "mastery"; no skill is completed until the learner has achieved the mastery level. The record system should promote feedback on student skill attainment to *both* instructor and learners, provide for remediation as needed, and encourage reevaluation of learner performance until mastery is achieved. Appropriate remediation strategies often should consider learning styles and other individual differences among learners. Learners should work on skills and activities until they achieve mastery. They should not be "passed on" without mastery. While learners may move ahead and work on other skills (i.e those for which all prerequisite skills have been mastered or those without prerequisites), work should also continue on the skills still requiring mastery. Students should not attempt higher-order skills until all prerequisite skills are mastered.	Assignment Sheet
5. There is an observable management system of psychomotor skill practice that provides for, promotes, and documents mastery learning.		Job Sheet/Skill Test
6. Skill mastery records are maintained for each learner, and learners have access to and make use of these records to monitor their skill acquisition.	Records should clearly indicate the skills each learner has mastered. One such record should profile or list the competencies that have been mastered and those to be mastered. Other performance indicators can be added and kept in a portfolio for each learner. Learners should have ready access to their portfolios to monitor their own progress in skill mastery and competency attainment.	Competency Profile

CORRECTIONS AND SUGGESTIONS

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This information will be used to correct the publication before the materials are reprinted. To ensure that the material is updated on a timely basis, notify the CIMC of necessary corrections as soon as possible after discovering the error.

2 Fold downward

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OBJECTIVE SHEET

BRICKLAYING MATERIALS A 1

INTRODUCTION

In this unit, you will study three basic categories of materials used in bricklaying:

1. The masonry building unit (brick and block).
2. Mortar
3. Reinforcement and hardware.

Understanding the makeup and uses of bricklaying material is basic knowledge required of a bricklayer.

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVE

After completing this unit, the student will be able to identify and state the proper uses of bricklaying materials. The student will demonstrate these competencies by completing the assignment sheet, job sheets, and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to show the ability to:

1. Given a list of terms associated with bricklaying material, match them to their correct definitions.
2. Provided drawings with dimensions, identify types of masonry building units.
3. Provided drawings, select the names of popular masonry configurations and brick/block positions.
4. Given a list of mortar types, match them to their characteristics.
5. Identify reinforcement and hardware. (Assignment Sheet 1)

SUGGESTED ACTIVITIES

BRICKLAYING MATERIALS

A 1

PREPARATION

- Review unit and plan presentation.
- Order or obtain materials to supplement unit.
- Give an overview of the course, explaining the organization of the materials from the foundation to the finished house.
- Introduce unit.

DELIVERY

Objective 1: Given a list of term associated with bricklaying material, match them to their correct definitions.

- Use the information sheets to discuss terms associated with bricklaying.
- Emphasize that the nominal size is the working size, that size includes an allowance for mortar.
- Obtain several examples of bricklaying material and ask the students to identify each.

Objective 2: Provided drawings with dimensions, identify the various types of masonry building units.

- Use actual brick and blocks to illustrate their shapes, color, and size.

Objective 3: Provided drawings, select the names of popular masonry configurations and brick/block positions.

- Have students lay up dry brick in various configurations and name the various titles by their position.

Objective 4: Given a list of mortar types, match them to their characteristics.

- Discuss the characteristics of mortar types.
- Explain the purpose of each ingredient in mortar.

APPLICATION

Objective 5: Identify reinforcement and hardware. (Assignment Sheet 1).

- Describe reinforcement hardware used in bricklaying.
- Show examples of each hardware reinforcement on a dry lay up of brick and/or block.
- Assign students to complete Assignment Sheet 1.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements from pretest results.
- Counsel students individually on pretest results and study requirements.
- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on assignment sheet activities.
- Evaluate students on job sheet activities.
- Complete appropriate section of competency profiles.
- Reteach and reevaluate if necessary.
- Modify materials in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.

  NOTE: The written test may be given in sections if desired.

- Give the written test.

- Complete appropriate sections of competency profiles.
- Reteach and retest if necessary.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.
- Modify materials in unit or create supplementary materials for individual students as required.

UNIT REFERENCES

- *Bricklaying — Brick and Block Masonry.* Reston, Virginia: Brick Institute of America, 1988.
- *Concrete Masonry Handbook for Architects, Engineers, Builders.* Portland Cement Association, 5420 Old Orchard Road, Skokie, Illinois 60077
- Kicklighter, Clois E. *Modern Masonry.* South Holland, Illinois: The Goodheart-Willcox Company, Inc., 1988.
- Kreh, R. T., Sr. *Masonry Skills.* New York: Delmar Publishers, Inc. 1990.
- *Masonry Skills.* Delmar Publishers Inc., Albany, New York 12205.
- *Modern Masonry.* The Goodheart-Willcox Company, Inc., South Holland, Illinois, 1988.
- Willey, Al. *Brick and Block Masonry.* Oklahoma Department of Vocational and Technical Education, Curriculum and Instructional Materials Center and The Associated General Contractors of America, 1992.

INFORMATION SHEET

BRICKLAYING MATERIALS

A 1

OBJECTIVE 1

Given a list of terms associated with bricklaying material, match them to their correct definitions.

INTRODUCTION

Terms used to describe bricklaying material have been classed into three categories, masonry building units, mortar, and reinforcement hardware.

- **Masonry building unit terms**
  - **absorption rate** — weight or amount of water a masonry unit absorbs at certain conditions for a stated length of time
  - **actual dimension** — the actual dimension of a building unit without mortar
  - **adhesion** — ability of mortar to stick to masonry unit
  - **compressive strength** — a masonry unit's resistance to increasing loads of stress placed on it before it breaks
  - **course** — horizontal row of masonry units
  - **dimensions** — measurements or sizes
  - **dry layout** — laying of masonry units without mortar between units
  - **durability** — ability to withstand wear, abrasion, and weathering
  - **masonry building unit** — a single brick or block
  - **modular** — refers to standardized units or dimensions for flexibility and variety in use
  - **mortar bond** — adhesion of mortar to masonry unit, wall ties, or other reinforcement

  - **muriatic acid**— a solution of hydrochloric acid used to clean masonry
  - **nominal dimension** — the size of a building unit including the mortar
  - **nonmodula** — refers to variations in size of standard brick and oversize brick
  - **pattern bond** — arrangement of masonry units to form a pattern, design, or texture
  - **setting time** — length of time required for mortar to harden enough to sustain the weight of masonry placed on top of it
  - **structural bond** — arrangement in which individual units are interlocked or tied together to distribute weight of wall
  - **texture** — arrangement of particles of raw materials in brick; appearance and finish of a brick

- **Mortar terms**
  - **accelerator** — speeds up setting time, thus helping to prevent freezing; increases early strength
  - **admixture** — component added in small quantities to mortar mix to achieve a specific result
  - **air-entraining agent** — admixture that incorporates microscopic air bubbles into the mix to increase resilience and durability
  - **autogenous healing** — ability of hairline cracks in mortar to reknit or reseal themselves
  - **buttering** — spreading mortar on a masonry unit with a trowel
  - **consistency** — degree of wetness and workability of mortar

- **cubic-foot measuring box** — box used to measure dry ingredients used in mortar
- **cut** — mix and blend mortar thoroughly to a desired consistency using chopping/pushing/pulling motion of hoe
- **durability** — ability to withstand wear, abrasion, and weathering
- **efflorescence** — deposit, usually white in color, of water-soluble salts on masonry surface
- **head joint** — vertical mortar joint between the ends of brick or block
- **ingredients** — components of a mixture
- **masonry cement** — mill-mixed combination of portland cement, lime, and additives
- **mud** — common term for mortar
- **pigment** — ingredient that produces a desired color to enhance appearance of masonry walls
- **portland cement** — manufactured product consisting of finely ground and mixed lime, silicon, alumina, iron, and gypsum
- **psi** — pounds per square inch
- **rake out or raking** — cleaning out mortar from a joint
- **set** — hardening of mortar
- **waterproofing agent** — prevents moisture from penetrating masonry walls
- **workability** — ease with which mortar can be placed and handled

- **Reinforcement hardware terms**
  - **accessory** — item used to help reinforce and/or anchor masonry units
  - **anchor** — piece or assemblage, usually metal, used to attach building parts or components to masonry
  - **anchor bolt** — steel bolt installed in masonry to secure a structural member
  - **backup wall** — that part of masonry wall behind the exterior facing
  - **bearing plate** — steel plate laid in mortar on masonry walls to provide a solid bed and to distribute weight of beams or joints placed on them
  - **bed joint** — horizontal layer of mortar on which a masonry unit is laid
  - **bond** — to tie various parts of masonry wall by overlapping units or by connecting units with metal ties
  - **cavity wall** — wall consisting of inner and outer wythes of masonry units separated by a continuous air space
  - **composite wall** — any bonded wall consisting of wythes of different masonry units

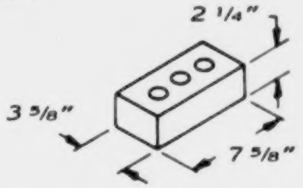
    EXAMPLE: Brick-and-concrete wall
  - **compressive strength** — measured amount of downward pressure that can be applied to a masonry material before it fractures or breaks
  - **lateral pressure** — horizontal component of force
  - **load-bearing** — ability of wall or other masonry to support a load in addition to its own weight

- **reinforcement** — metal bars, wires, or other slender members embedded in concrete so that metal and concrete act together in resisting forces
- **tensile strength** — measure of a material's ability to withstand stretching
- **veneer** — protective or ornamental facing not structurally bonded
- **wall tie** — metal piece that connects wythes of masonry to each other or to other materials
- **wythe** — each continuous vertical section of masonry one unit thick

OBJECTIVE 2 **Provided drawings with dimensions, identify the various types of masonry building units.**

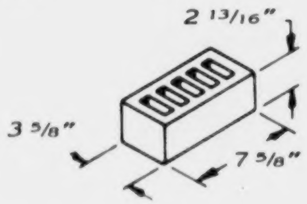
- **Sizes of Brick**
  - Modular — 4" x 2 2/32" x 8"

FIGURE 1



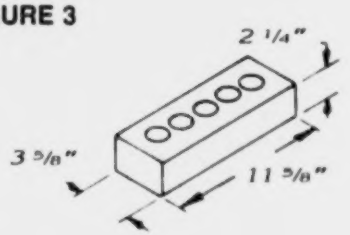
  - Engineer — 4" x 3 1/5" x 8"

FIGURE 2



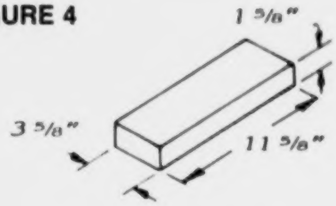
— Norman 4" x 2 ⅔" x 12"

FIGURE 3



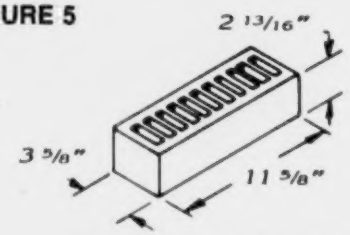
— Roman — 4" x 2" x 12"

FIGURE 4



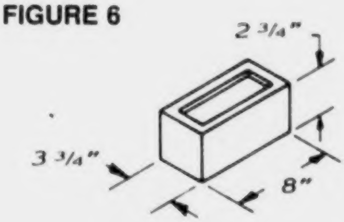
— Norwegian — 4" x 3 ¾" x 12"

FIGURE 5



— Oversize — 3 ¾" x 2 ¾" x 8"

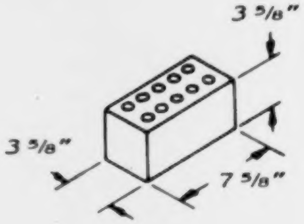
FIGURE 6



NOTE: Oversize brick is measured in actual dimensions.

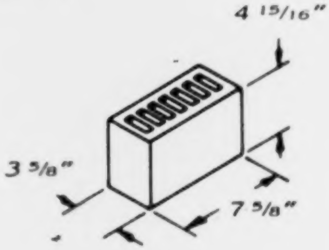
— Economy 8 or jumbo closure —
4" x 4" x 8"

FIGURE 7



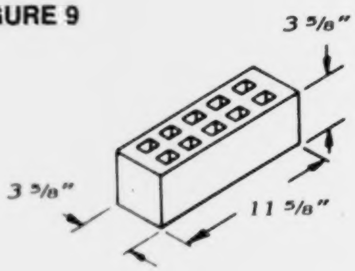
— Double — 4" x 5 ⅓" x 8"

FIGURE 8



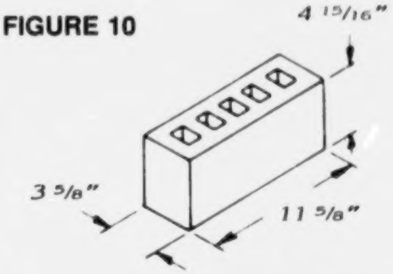
— Economy 12 or jumbo utility —
4" x 4" x 12"

FIGURE 9



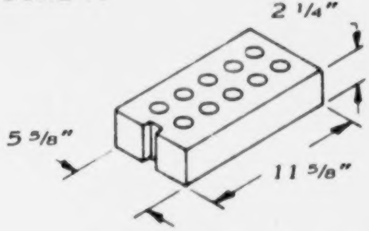
- Triple — 4" x 5 ⅓" x 12"

FIGURE 10



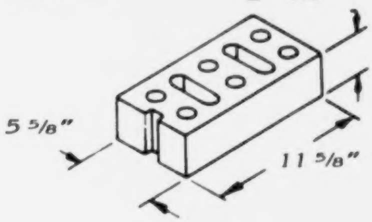
- SCR — 6" x 2 ⅔" x 12"

FIGURE 11



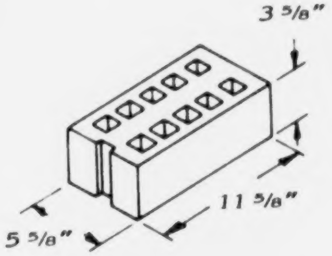
- 6-inch Norwegian — 6" x 3 ⅕" x 12"

FIGURE 12



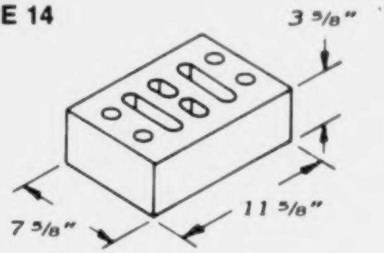
- 6-inch jumbo — 6" x 4" x 12"

FIGURE 13



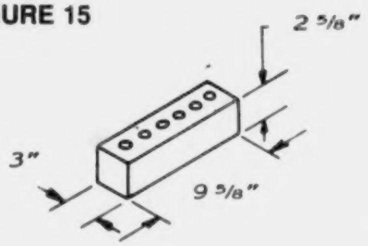
- 8-inch jumbo — 8" x 4" x 12"

FIGURE 14



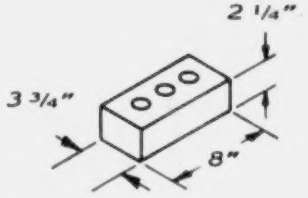
- 3-inch — 3" x 2 ¾" x 9 ¾"

FIGURE 15



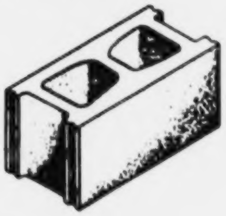
- Nonmodular — 3 ¾" x 2 ¼" x 8"

FIGURE 16



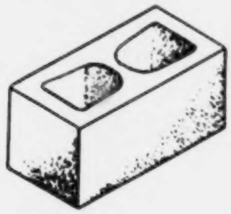
- **Block**
  - Stretcher
  - Corner

FIGURE 17



8" × 8" × 16"

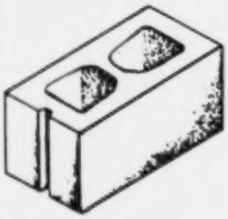
FIGURE 18



8" × 8" × 16"

— Jamb

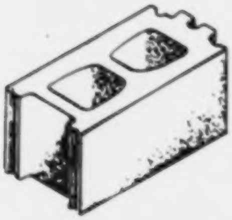
FIGURE 19



8″ × 8″ × 16″

— Control joint

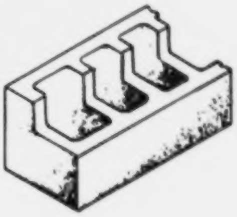
FIGURE 20



8″ × 8″ × 16″

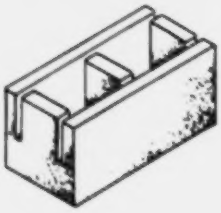
— Header

FIGURE 21



— Knockout bond beam

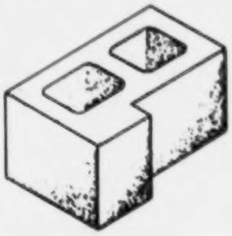
FIGURE 22



10″ × 8″ × 16″

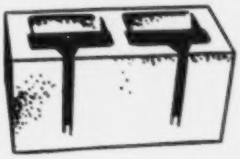
— Return corner

FIGURE 23



— Sound absorbing

FIGURE 24

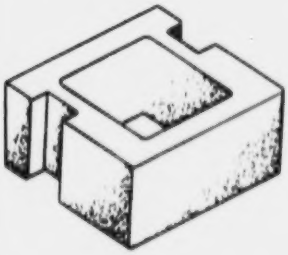


8″ × 8″ × 16″

votech

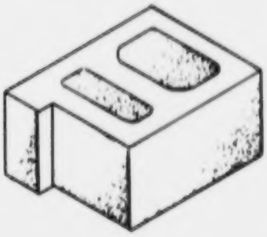
— Pilaster

FIGURE 25



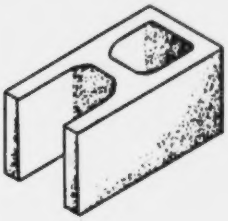
— Combination jamb

FIGURE 26



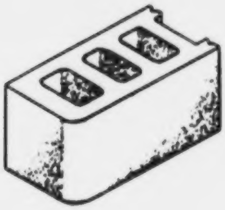
— Conduit

FIGURE 27



— Bullnose

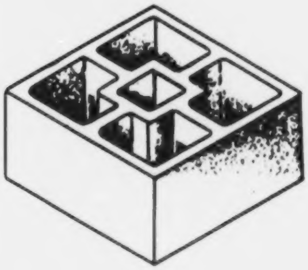
FIGURE 28



8″ × 8″ × 16″

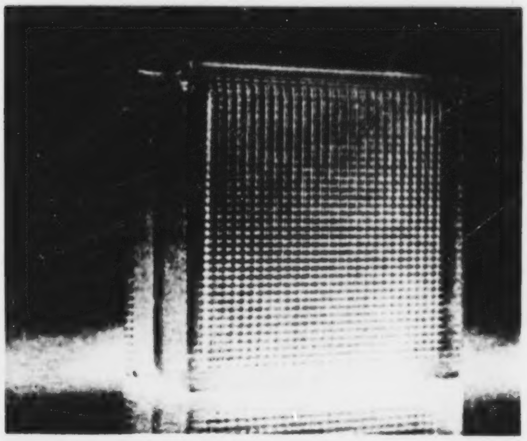
— Ornamental

FIGURE 29



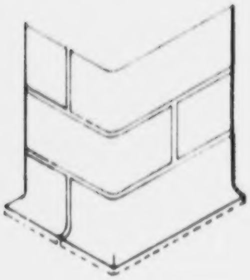
- Glass block

FIGURE 30



- Structural glazed tile

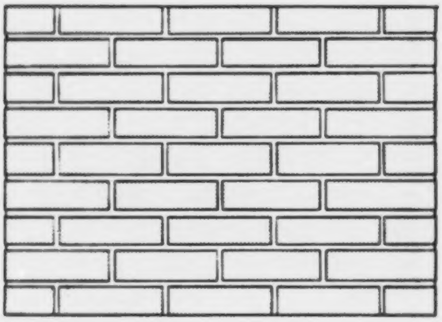
FIGURE 31



OBJECTIVE 3 **Provided drawings, select the names of popular masonry configurations and brick/block positions.**

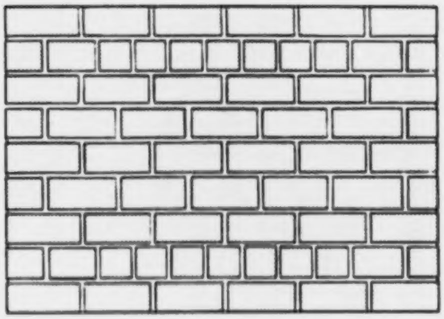
- **Brick and block configurations**
  - Running (stretcher)

FIGURE 32



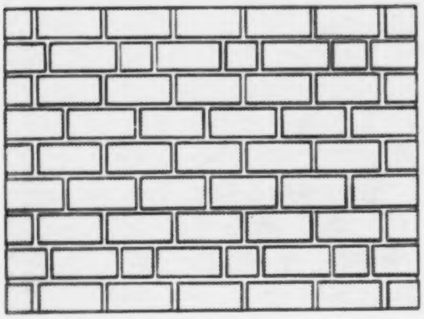
- Common (American)

FIGURE 33



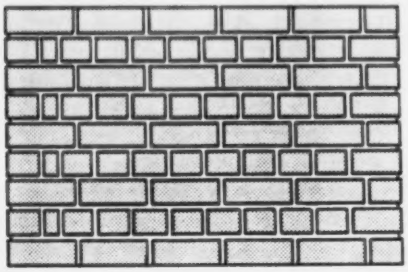
— Flemish

FIGURE 34



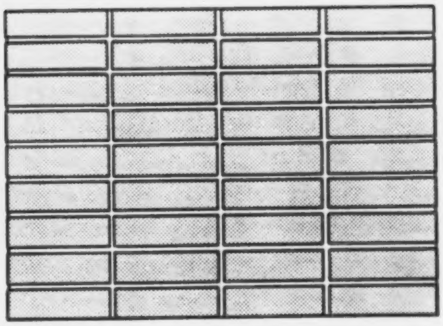
— English

FIGURE 35



— Stack

FIGURE 36



- **Brick Titles**
  - Stretcher
  - Header

FIGURE 37

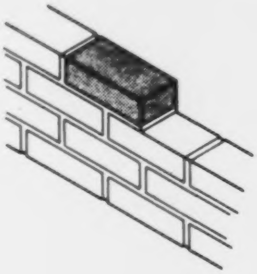
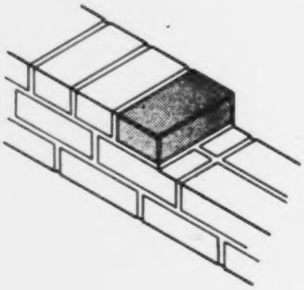


FIGURE 38



  - Soldier
  - Shiner or Rowlock stretcher

FIGURE 39

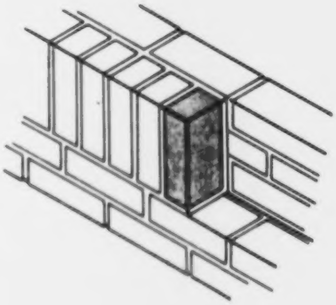
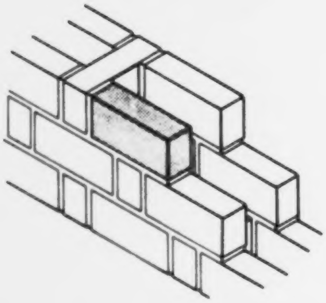


FIGURE 40



  - Rowlock
  - Sailor

Figure 41

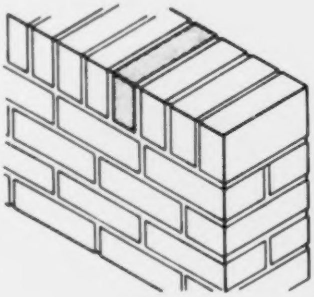
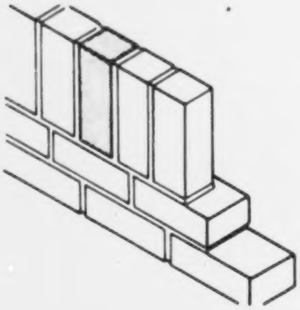


FIGURE 42



OBJECTIVE 4

Given a list of mortar types, match them to their characteristics.

INTRODUCTION

Portland cement/time mortars and masonry cement mortars are each divided into four types of mortars determined by the proportions of their ingredients. The Brick Institute of America (BIA) developed the specifications for these four types of mortar. See Table I.

- **Mortar Types**
  - **Type M** (mortar with a high compressive strength of at least 2,500 psi after curing 28 days and with somewhat greater durability than some other types) — Used for masonry below grade and in contact with the earth, such as foundations, retaining walls, and manholes; will withstand severe frost action and high lateral loads
  - **Type S** (mortar with a fairly high compressive strength of at least 1,800 psi after curing 28 days) — Used in reinforced masonry and for standard masonry where maximum flexural strength is required; also used when mortar is the sole bonding agent between facing and backing units
  - **Type N** (mortar with a medium compressive strength of at least 750 psi after being cured 28 days) — Used for exposed masonry above grade and where high compressive strength or lateral masonry strengths are required
  - **Type O** (mortar with a low compressive strength of at least 350 psi after curing 28 days) — Used for general interior walls; may be used for load-bearing walls of solid masonry if axial compressive stress does not exceed 100 psi and wall will not be exposed to weathering or freezing

EXAMPLE:

TABLE 1: Mortar Proportions by Volume

Portland Cement/Lime Mortars

Type		Hydrated Lime or Lime Putty	Sand
M	1	¼	3
S	1	½	4 ½
N	1	1	6
O	1	2	9

OBJECTIVE 5 **Identify reinforcement and hardware.** (Assignment Sheet 1)

Reinforcement hardware is used to strengthen structures, prevent cracks, tie masonry work together and provide attachment of other building components.

- **Reinforcement Hardware**
  - **Wall ties**
    - Corrugated wall or veneer tie
    - Z-tie

FIGURE 43

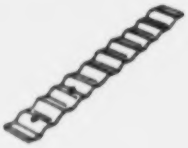
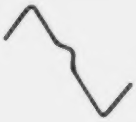
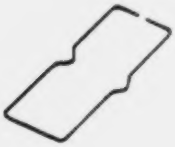


FIGURE 44



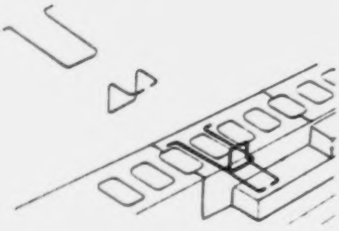
- Rectangular tie

FIGURE 45



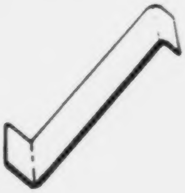
- Type-A adjustable tie

FIGURE 46



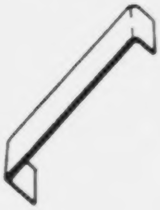
- Type-Z adjustable tie

FIGURE 47



- Type-S adjustable tie

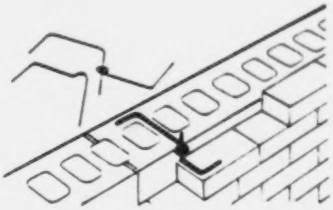
FIGURE 48



Figures 43 through 48 used with permission of AA Wire Products Company, Inc.

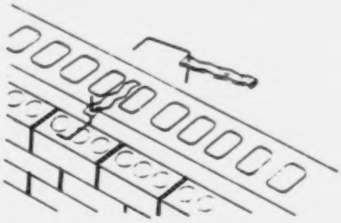
- **Masonry anchors**
  - Strap anchor

FIGURE 49



  - Strap cramp anchor

FIGURE 50



Figures 49 and 50 used with permission of AA Wire Products Company, Inc.

- Strap anchor with twist
- Strap anchor with one end split bend

FIGURE 51

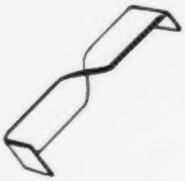
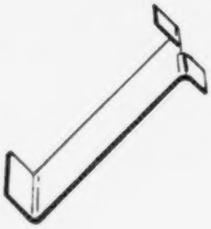
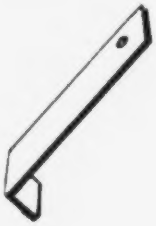


FIGURE 52



- Strap anchor with hole for pin or dowel

FIGURE 53



- **Dovetail anchors**
  - Dovetail brick anchor
  - Two-way dovetail anchor

FIGURE 54

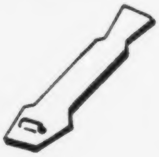
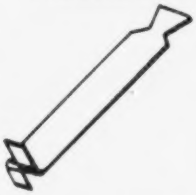


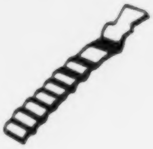
FIGURE 55



Figures 51 through 55 used with permission of AA Wire Products Company, Inc.

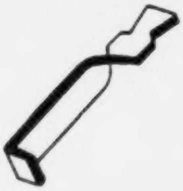
— Corrugated dovetail anchor for cavity wall

FIGURE 56



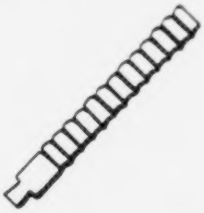
— Dovetail anchor with twist

FIGURE 57



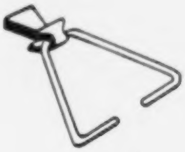
— Dovetail partition anchor

FIGURE 58



— Dovetail flex-O-lock

FIGURE 59

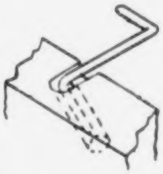


Figures 55 through 59 used with permission of AA Wire Products Company, Inc.

- **Rod anchors**

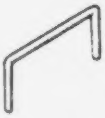
— Rod anchor

FIGURE 60



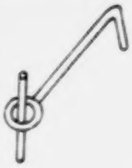
— Rod cramp anchor

FIGURE 61



— Rod anchor with eye for pin or dowel

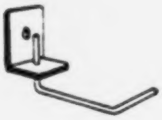
FIGURE 62



- **Miscellaneous anchors**

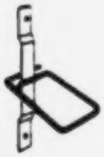
— Adjustable veneer tie

FIGURE 63



— Anchor with box tie

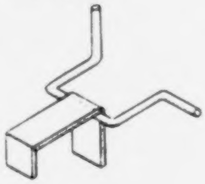
FIGURE 64



Figures 60 and 64 used with permission of AA Wire Products Company, Inc.

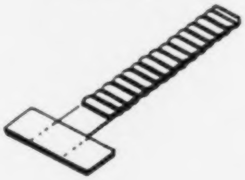
— Anchor clip and loop

FIGURE 65



— Door buck anchor

FIGURE 66



Figures 65 and 66 used with permission of AA Wire Products Company, Inc.

- Column anchors
- Column anchors with turn down

FIGURE 67

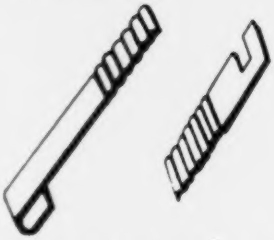
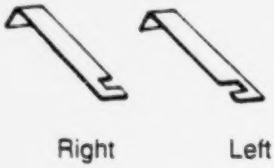


FIGURE 68



Figures 67 and 68 used with permission of AA Wire Products Company, Inc.

- Welded bar lugs on shelf angle support
- Right-wedge anchor for shelf angle support

FIGURE 69

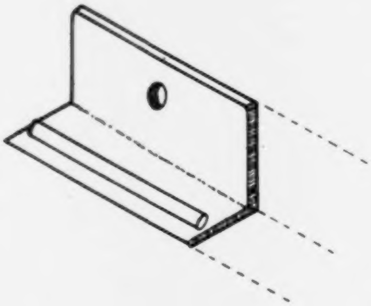
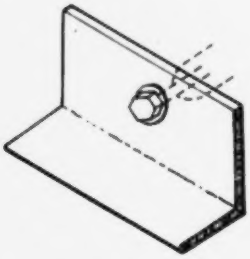
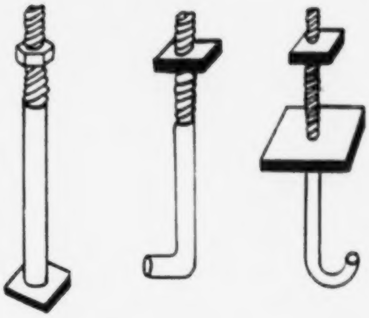


FIGURE 70



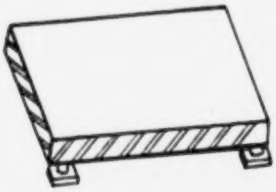
— Anchor bolts

FIGURE 71



— Bearing plate

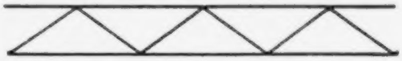
FIGURE 72



- **Joint reinforcement**

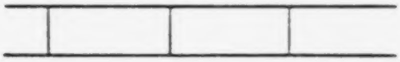
— Regular truss type

FIGURE 73



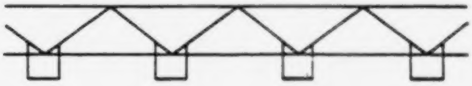
— Regular ladder type

FIGURE 74



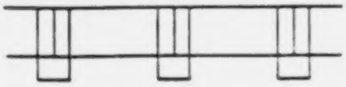
— Truss tab-tie

FIGURE 75



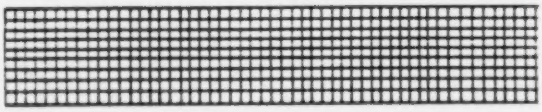
— Regular tab tie

FIGURE 76



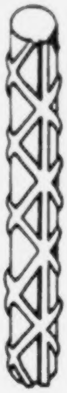
— Wire mesh

FIGURE 77



— Reinforcing steel (Rebar)

FIGURE 78



ASSIGNMENT SHEET 1

BRICKLAYING MATERIALS

A 1

Name ____________________ Score ________

OBJECTIVE 1 **Identify reinforcement and hardware and match each with their title (Assignment Sheet 1).**

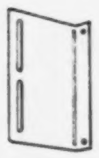
INTRODUCTION Completing this assignment sheet will help you recognize and familiarize yourself with the different types of anchors and reinforcing materials available to the bricklayer.

DIRECTIONS Distinguish among types of accessories. Write an "X" in the blank under each correct illustration.

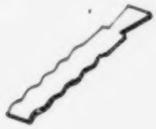
Functional Reading Skills
- Use content area vocabulary

Cognitive Activity Skills
- Transfer knowledge/training to new situations

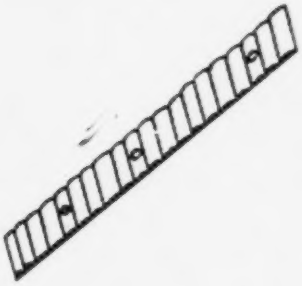
1. Corrugated wall or veneer tie



A. ________



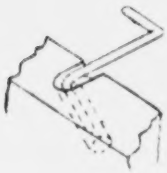
B. ________

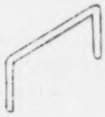


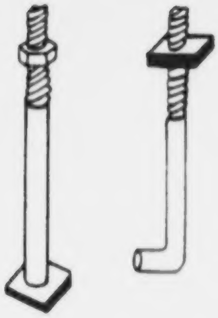
C. ________

votech

2. Rod anchor

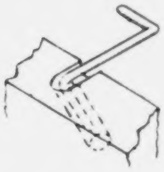


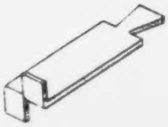


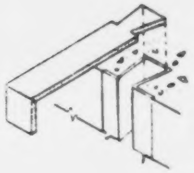


A. ____________ B. ____________ C. ____________

3. Two-way dovetail anchor

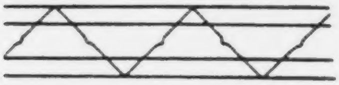


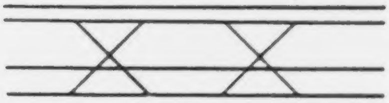




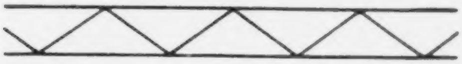
A. ____________ B. ____________ C. ____________

4. Regular truss type reinforcement



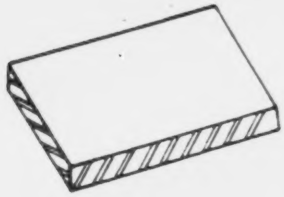


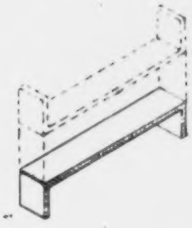
A. ____________ B. ____________

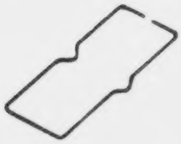


C. ____________

5. Rectangular tie

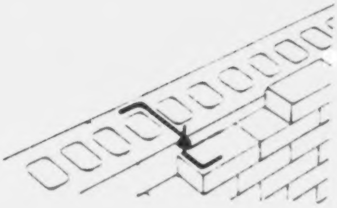


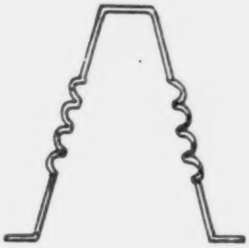


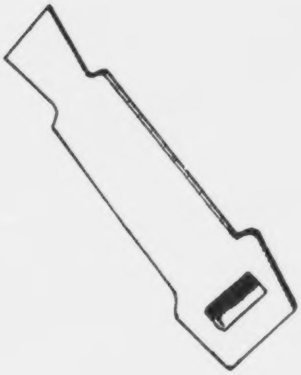


A. ____________ B. ____________ C. ____________

6. Strap anchor

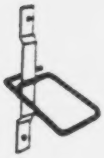


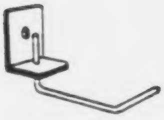


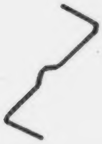


A. ____________ B. ____________ C. ____________

7. Z-tie

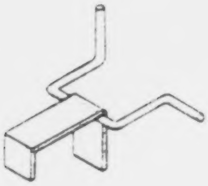
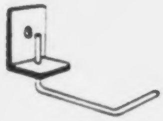
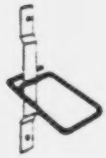






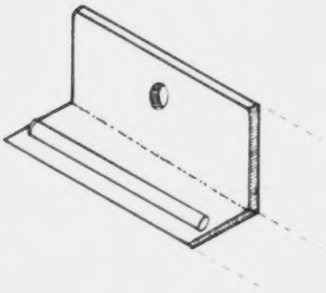
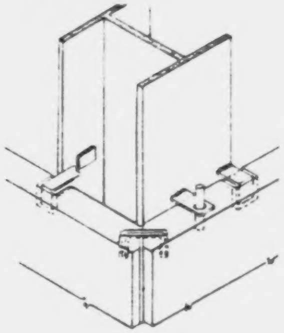
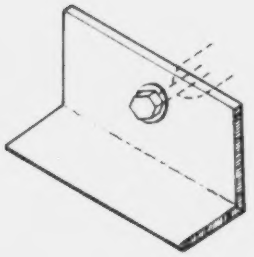
A. ____________ B. ____________ C. ____________

8. Anchor clip and loop

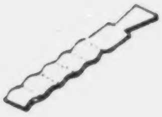
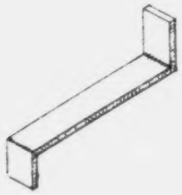
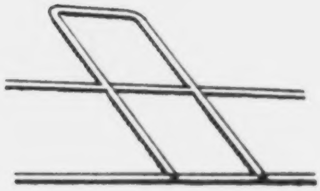
A. __________ B. __________ C. __________

9. Welded bar lugs on shelf angle support

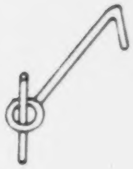
A. __________ B. __________ C. __________

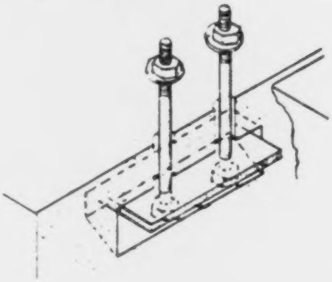
10. Dovetail anchor for cavity wall

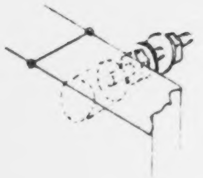




A. __________ B. __________ C. __________

11. Rod anchor with eye for pin or dowel

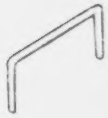


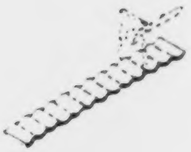


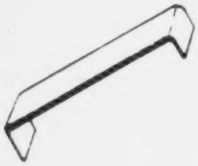


A. ____________ B. ____________ C. ____________

12. Strap cramp anchor

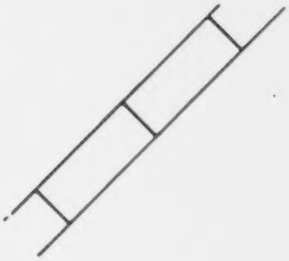


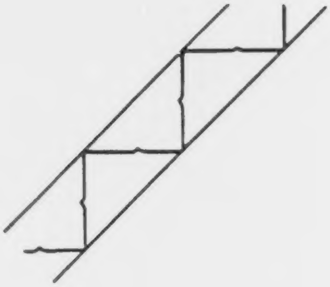


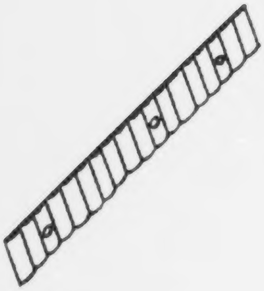


A. ____________ B. ____________ C. ____________

13. Regular ladder type reinforcement







A. ____________ B. ____________ C. ____________

ASSIGNMENT ANSWERS

BRICKLAYING MATERIALS

A 1

ASSIGNMENT SHEET 1

1. C
2. A
3. B
4. C
5. C
6. A
7. C
8. A
9. A
10. A
11. A
12. B
13. A

WRITTEN TEST

BRICKLAYING MATERIALS

A 1

Name ______________________ Score ________

OBJECTIVE 1

Given a list of terms associated with bricklaying material, match them to their correct definitions. Write the letter that corresponds to the most correct answer.

_____ 1. A horizontal row of masonry units is called a/an

a. course
b. row
c. pattern
d. dimensional row

_____ 2. What is the term that describes a solution used to clean masonry?

a. Muriatic acid
b. Polyacete
c. Masonry acid
d. Acetone

_____ 3. The size of a masonry building unit that includes the mortar is called

a. actual dimension
b. course depth
c. nominal dimension
d. row width

_____ 4. What is the ability of mortar to stick to masonry units?

a. Mortarability
b. Adhesion
c. Sticktion
d. Durability

May be photocopied for student use.

_____ 5. The length of time required for mortar to harden enough to sustain the weight of masonry placed on top of it is called

a. dry bonding
b. durability time
c. texture bonding
d. setting time

_____ 6. The practice of laying of masonry units without the use of mortar between them is called

a. dry bonding
b. stack testing
c. dry layout
d. dry set

_____ 7. A deposit, usually white in color, of water soluble salts on masonry surfaces is known as

a. efflorescence
b. consistency
c. pigmentation stain
d. bond mark

_____ 8. Another commonly used term to describe mortar is

a. butter
b. bond
c. tack
d. mud

_____ 9. Spreading mortar on a masonry unit with a trowel is often called

a. raking
b. buttering
c. bonding
d. spreading honey

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_____10. The term that best describes a steel bolt installed in masonry to secure a structural member is a/an

a. bonding bolt
b. compressive bolt
c. anchor bolt
d. joint rod

_____11. Which of the following terms describes a masonry unit's resistance to increasing loads or stress before it breaks?

a. Composite load
b. Bond pressure
c. Compressive strength
d. Anchor value

_____12. The ability to withstand wear, abrasion, and weathering is

a. compressive strength
b. bonding
c. durability
d. workability

_____13. A bonded wall consisting of wythes of different masonry units is a

a. cavity wall
b. backup wall
c. composite wall
d. bonded wall

_____14. To clean out mortar from a joint is

a. setting
b. buttering
c. accelerating
d. raking

_____15. The ease with which mortar can be placed and handled is

a. durability
b. cut
c. workability
d. consistency

May be photocopied for student use.

______16. A single brick or block is a

a. modular unit
b. masonry unit
c. structural unit
d. nominal unit

______17. A horizontal row of masonry units is a

a. masonry building unit
b. course
c. modular unit
d. layout

______18. A wall consisting of inner and outer wythes of masonry units separated by a continuous air space is a

a. backup wall
b. composite wall
c. load-bearing wall
d. cavity wall

______19. The ability of hairline cracks in mortar to reknit or reseal themselves is

a. mortargenic healing
b. autogenous healing
c. setting
d. raking out

______20. The correct masonry term for an ingredient that produces a desired color to enhance appearance of masonry walls is

a. pigment
b. chalk
c. coloring
d. dye

May be photocopied for student use.

_____21. The arrangement in which individual units are interlocked or tied together to distribute the weight of a wall is the

a. autogenous healing
b. course pattern
c. masonry bond
d. structural bond

_____22. The term that refers to standardized units or dimensions for flexibility and variety in use is

a. modular
b. consistency
c. structural bond
d. durability

_____23. An item used to help reinforce and/or anchor masonry units is a/an

a. accessory
b. bond
c. bearing plate
d. anchor bolt

_____24. The vertical mortar joint between the end of brick or block is the

a. head joint
b. bed joint
c. structural bond
d. bearing plate

_____25. When mortar sets, it

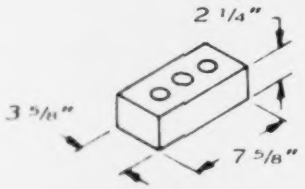
a. is wet
b. is spreadable
c. hardens
d. heals

May be photocopied for student use.

OBJECTIVE 2

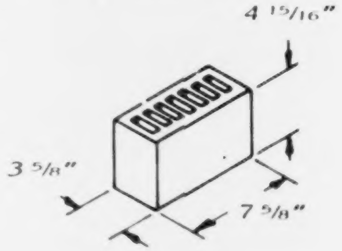
Provided drawings with dimensions, identify the various types of masonry building units.

_____ 1. The masonry building unit shown is a



a. norman brick
b. roman brick
c. modular brick
d. double brick

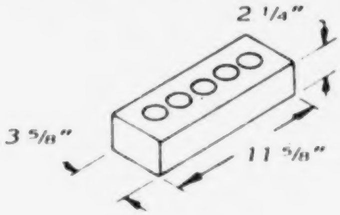
_____ 2. The following figure represents a



a. triple block
b. roman brick
c. engineer brick
d. double brick

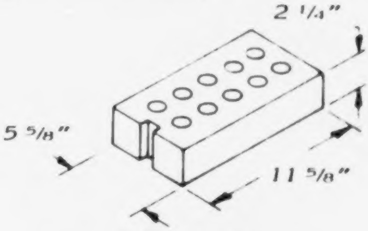
May be photocopied for student use

_____ 3. The masonry building unit shown below is a



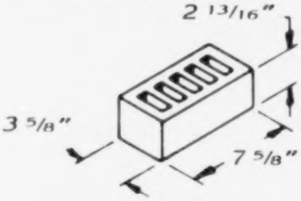
a. norman brick
b. roman brick
c. engineer block
d. standard block

_____ 4. This masonry unit is a/an



a. 6-inch jumbo
b. 6-inch Norwegian
c. SCR
d. triple

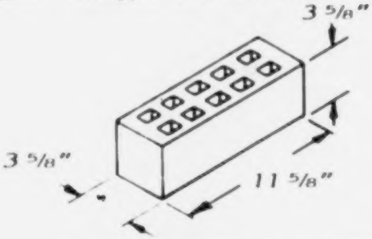
_____ 5. The masonry unit shown below is a



a. Norman brick
b. Roman brick
c. engineer brick
d. double brick

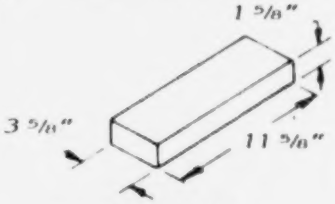
May be photocopied for student use.

_____ 6. The type brick below is a



a. jumbo utility or economy 12
b. standard
c. modular
d. double

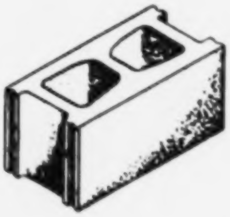
_____ 7. This unit is a



a. Norman brick
b. Roman brick
c. Norwegian brick
d. English brick

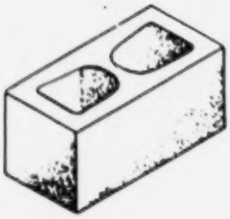
May be photocopied for student use

_____ 8. The block type below is a



a. jamb
b. stretcher
c. corner
d. header

_____ 9. The building unit shown in the figure below is a

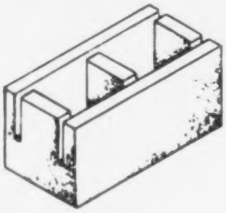


a. stretcher
b. corner
c. jamb
d. control joint

May be photocopied for student use.

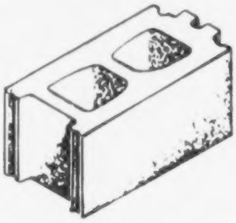
votech

_____10. The block below is a __________ block



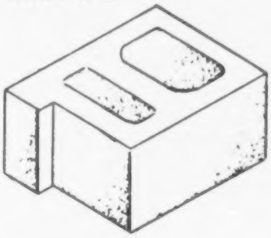
a. header pad
b. control joint
c. corner joint
d. bond beam

_____11. The block below is a



a. knockout bond beam
b. control joint
c. corner
d. jamb

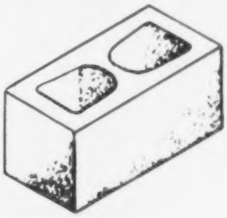
_____12. This block is a



a. control joint
b. ornamental
c. header
d. combination jamb

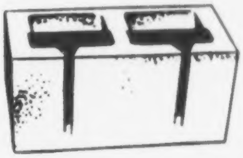
May be photocopied for student use

_____13. The masonry unit below is a/an



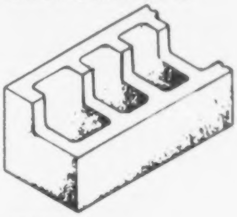
a. corner block
b. 8-inch jumbo
c. jamb
d. stretcher

_____14. This block is a



a. header
b. pilaster
c. combination jamb
d. sound absorbing

_____15. The block below is a

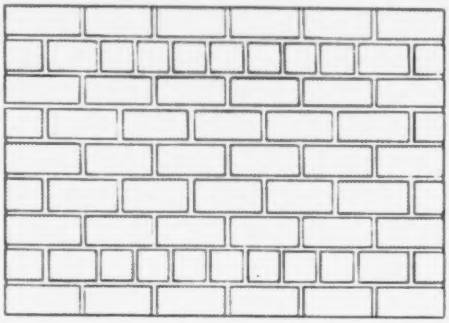


a. conduit
b. bullnose
c. header
d. return corner

May be photocopied for student use.

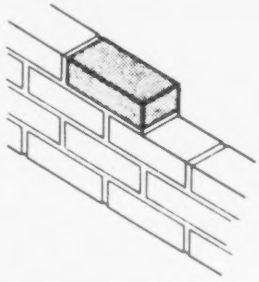
OBJECTIVE 3 **Provided drawings, select the names of popular masonry configurations and brick/block position.**

_____ 1. The brick configuration shown in the figure below is known as



a. lapped (English)
b. Flemish
c. common (American)
d. stack

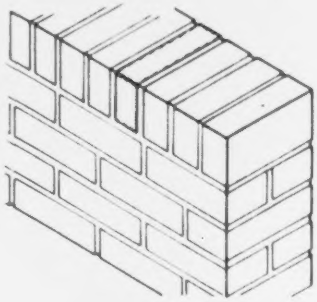
_____ 2. When a brick is placed as shown below, it is a



a. stretcher
b. soldier
c. header
d. sailor

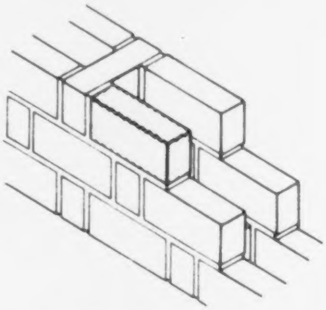
May be photocopied for student use

_____ 3. When a brick is set in the position shown below, it is described as a



a. shiner
b. header
c. soldier
d. rowlock

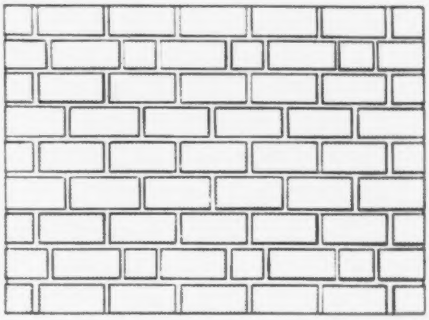
_____ 4. A brick positioned as shown below is called a



a. header
b. shiner or rowlock stretcher
c. soldier or rowlock
d. sailor

May be photocopied for student use.

_____ 5. The configuration below is named



a. English
b. common (American)
c. Flemish
d. running

OBJECTIVE 4 **Given a list of mortar types, match them to their characteristics.**

_____ 1. Mortar that is mixed to withstand severe frost action and high lateral loads is type

a. M
b. S
c. N
d. O

_____ 2. Mortar with the lowest compressive strength is

a. M
b. S
c. O
d. P

May be photocopied for student use

_____ 3. Mortar that is mixed with 6 parts sand is type

a. S
b. N
c. O
d. M

NOTE: Objective 5 is evaluated on Assignment Sheet 1 in this unit. If you have not completed this component, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

BRICKLAYING MATERIALS

A 1

OBJECTIVE 1

1. a
2. a
3. c
4. b
5. d
6. c
7. a
8. d
9. b
10. c
11. c
12. c
13. c
14. d
15. c
16. b
17. b
18. d
19. b
20. a
21. d
22. a
23. a
24. a
25. c

OBJECTIVE 2

1. c
2. d
3. a
4. c
5. c
6. a
7. b
8. b
9. b
10. d
11. b
12. d
13. a
14. d
15. c

OBJECTIVE 3

1. c
2. a
3. d
4. b
5. c

OBJECTIVE 4

1. a
2. c
3. b

OBJECTIVE SHEET

BRICKLAYING TOOLS

A 2

INTRODUCTION

Using the proper tool for its intended purpose and doing so in a safe manner is the mark of a competent bricklayer.

This unit provides you an excellent introduction to the basic tools and equipment used in bricklaying. Job sheets offer a brief but important practice session in the use of selected tools.

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVE

After completing this unit, the student will be able to identify and use selected tools and equipment. The student will demonstrate these competencies by completing the job sheets and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to show the ability to:

1. Given a list of terms associated with bricklaying tools, match them to their correct definitions.
2. Provided drawings, identify types of hand tools used in bricklaying.
3. Given illustrations, identify types of power tools used in bricklaying.
4. Use a brick trowel correctly. (Job Sheet 1)
5. Using common bricklaying hand tools, cut brick and block. (Job Sheet 2)
6. Use a level. (Job Sheet 3)
7. Use a brick spacing rule. (Job Sheet 4)

BRICKLAYING TOOLS

PREPARATION

- Review unit and plan presentation.
- Order or obtain materials to supplement unit.
- Give an overview of the course, explaining the organization of the materials from the foundation to the finished house.
- Introduce unit.

DELIVERY

Objective 1: Given a list of terms associated with bricklaying tools, match them to their correct definitions.

- Display examples of tools and equipment when possible.
- Emphasize the difference between a modular spacing rules and the standard spacing rule.

Objective 2: Provided drawings, identify types of hand tools used in bricklaying.

- Have students identify hand tools.
- Plan a field trip to a construction site to see how various tools are used.
- Show video "Eye and Face Protection."

Objective 3: Given illustrations, identify types of power tools used in bricklaying.

- Emphasize the importance of safety when using power tools.
- Review appropriate sections of the construction safety unit, *Fundamentals of Construction.*

APPLICATION

Objective 4: Use a brick trowel correctly. (Job Sheet 1)

- Assign students to complete Job Sheet 1.

Objective 5: Using common bricklaying hand tools, cut brick and block. (Job Sheet 2)

- Assign students to complete Job Sheet 2.

Objective 6: Use a level. (Job Sheet 3)

- Assign students to complete Job Sheet 3.

Objective 7: Use a brick spacing rule. (Job Sheet 4)

- Assign students to complete Job Sheet 4.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements from pretest results.
- Counsel students individually on pretest results and study requirements.
- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on assignment sheet activities.
- Evaluate students on job sheet activities.
- Complete appropriate section of competency profiles.
- Reteach and reevaluate if necessary.
- Modify materials in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.
- Complete appropriate sections of competency profiles.
- Reteach and retest if necessary.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Eye and Face Protection.* AGC of America, 1957 E Street N.W., Washington, DC 20006, video.

UNIT REFERENCES

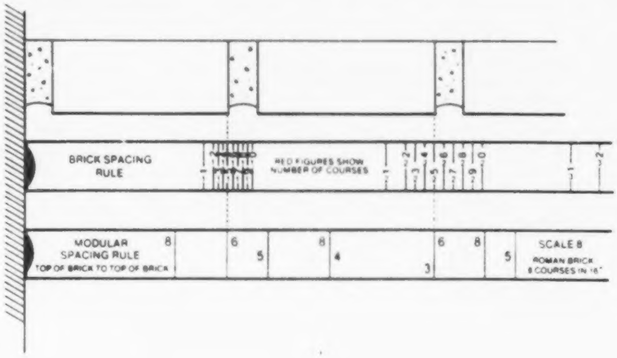
- *Bricklaying — Brick and Block Masonry.* Reston, Virginia: Brick Institute of America, 1988.
- WIlley, Al. *Brick and Block Masonry.* Stillwater, Oklahoma: Oklahoma Department of Vocational and Technical Education, Curriculum and Instructional Materials Center and The Associated General Contractors of America, 1992.

OBJECTIVE 1

Given a list of terms associated with bricklaying tools, match them to their correct definitions.

- **brick spacing rule** — used for spacing nonmodular brick course height

FIGURE 1



- **brick tongs** — tool designed for moving or carrying several bricks
- **chalk box and line** — reel-type container holding chalk and line
- **corner pole** — adjustable rigid pole with line holder; used as a guide rather than building corners for a guide
- **ferrule** — metal band around the handle of a trowel
- **fin** — narrow projection on a formed concrete surface caused when mortar flows into narrow voids in form
- **hod** — a v-shaped tool used to carry small amounts of mortar
- **jointer** — special shaped tools designed to finish the mortar joints in masonry

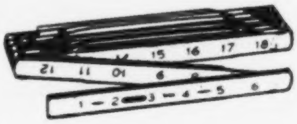
- **line block** — wood or plastic device used to keep mason's line tight
- **line pin** — metal device used for securing mason's line at both ends of course height
- **modular rule** — tool used for spacing course height when using modular materials
- **mortarboard or pan** — platform or pan used to hold mortar at a convenient location and height for bricklayers
- **parge** — to apply a thin coating of mortar or plaster to masonry
- **rake** — metal device designed to rake out and shape mortar joints
- **reglet** — groove or slot in a wall where flashing is inserted
- **skewback** — sloping surface against which the end of an arch rests; may be brick cut on an angle
- **story pole** — pole or rod upon which are indicated all of the masonry courses and openings, such as windows or doors, required in the job
- **temper** — to add water to mortar to make it more workable
- **twig** — a small tool used to support a mason's line at the center of wall; also known as a line twig
- **trowel** — tool used to apply, spread, shape and smooth mortar when laying brick or block

OBJECTIVE 2 **Provided drawings, identify types of hand tools used in bricklaying.**

- **Measuring and alignment tools**

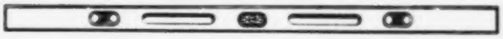
— Brick spacing rule

FIGURE 2



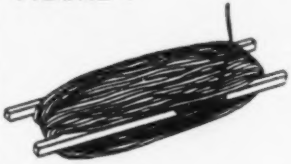
— 48-inch level

FIGURE 3



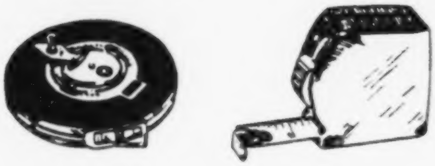
— Mason's line

FIGURE 4



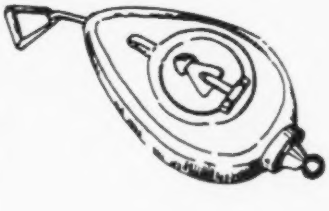
— Steel tapes

FIGURE 5



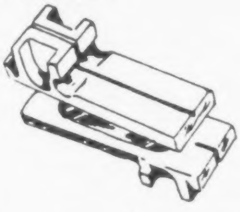
— Chalk box and line

FIGURE 6



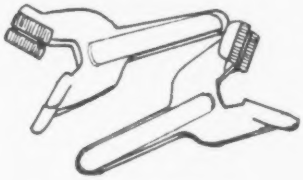
— line blocks

FIGURE 7



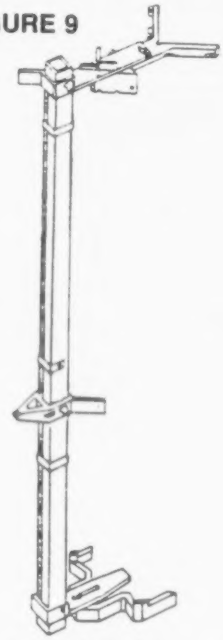
— corner blocks

FIGURE 8



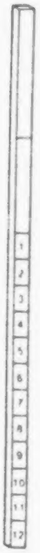
— Corner pole

FIGURE 9



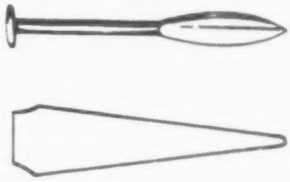
— Story pole

FIGURE 10



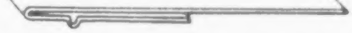
— Line pins

FIGURE 11



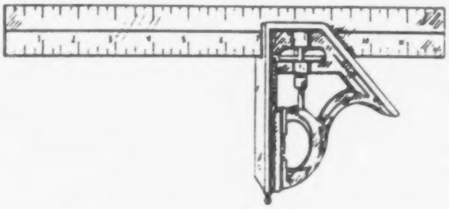
— Line twig

FIGURE 12



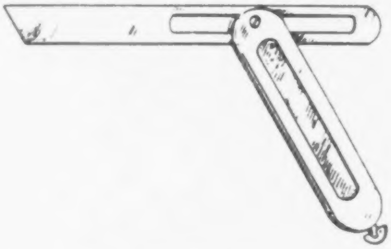
- **Squares and their uses**
  - Combination — marking straight cuts of angles

FIGURE 13



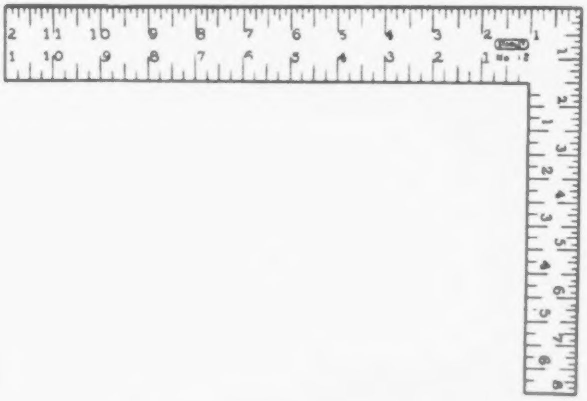
  - Bevel — marking various angles

FIGURE 14



  - Steel framing square — laying out walls, corners, and checking square of corner units

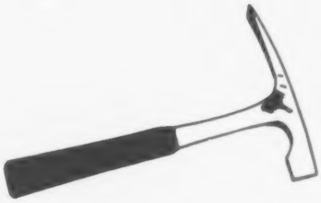
FIGURE 15



- **Hammers and their uses**

  — Brick hammer

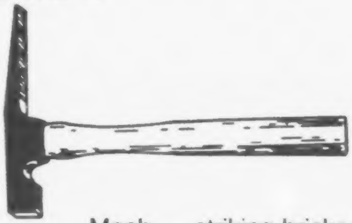
FIGURE 16



1. cutting bricks and blocks
2. setting line pins
3. cutting off fins and projections
4. nailing wall ties

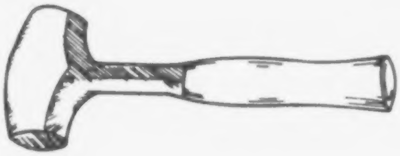
— Tile hammer — cutting tile

FIGURE 17



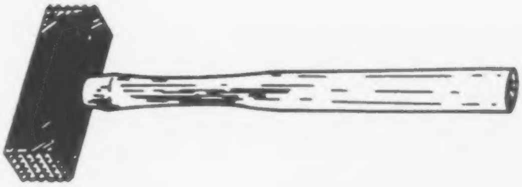
— Mash — striking brickset and other chisels

FIGURE 18



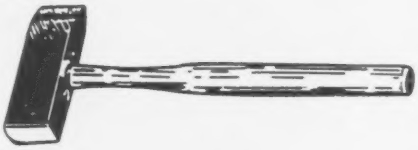
— Bushhammer — facing block or stone

FIGURE 19



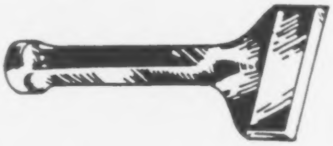
- Stonemason's hammer — cutting and splitting stone

FIGURE 20



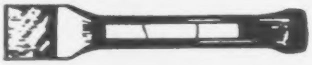
- Chisels and their uses
  - Brick set — cutting brick or block

FIGURE 21



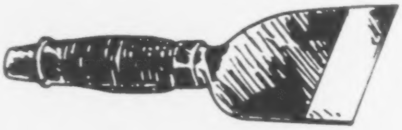
- Mason's chisel — cutting brick, block, and veined stone

FIGURE 22



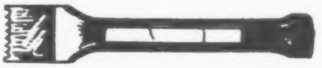
- Rubber-grip mason's chisel — cushioning blow while cutting brick, block, or stone

FIGURE 23



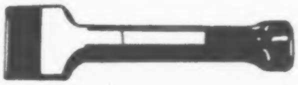
- Tooth chisel — cutting soft stone

FIGURE 24



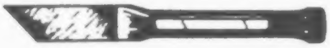
- Pitching tool — sizing, trimming, and facing hard stone; cutting heavy stone

FIGURE 25



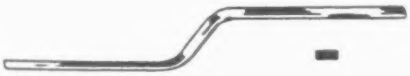
- Plugging chisel — chipping mortar from joints

FIGURE 26



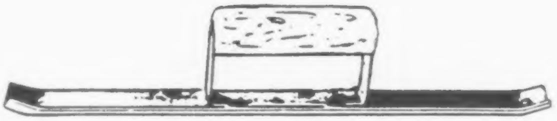
- **Jointers and rakes and their uses**
  - Flat jointer — compressing and shaping joints

FIGURE 27



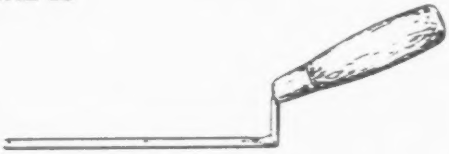
- V-jointer and sled-runner V-jointer
  1. Compressing joints
  2. Weatherproofing joints
  3. Giving a V-design to joints

FIGURE 28



- Caulking trowel (tuck-pointer)
  1. compressing joints
  2. pointing joints
  3. shaping joints

FIGURE 29



- Concave jointer and sled-runner concave jointer
  1. compressing joints
  2. weatherproofing joints
  3. giving concave appearance to joints

FIGURE 30

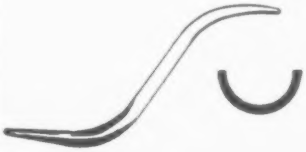
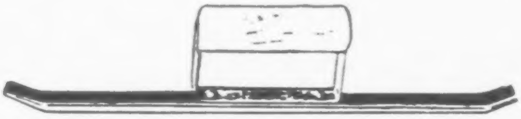


FIGURE 31



- Rake and skate-wheel rake

  1. raking out joints and leaving the desired finish

  2. creating attractive joint designs

FIGURE 32

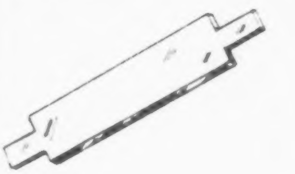
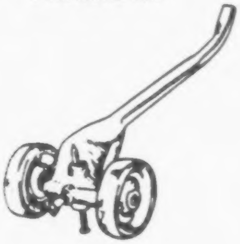


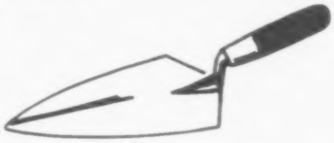
FIGURE 33



- **Trowels and their uses**

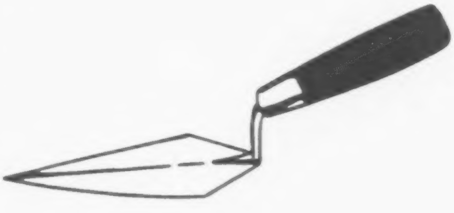
  - Brick trowel — spreading mortar for laying brick, block and stone

FIGURE 34



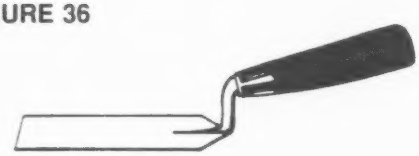
  - Pointing trowel — pointing, grouting, and mixing mortar

FIGURE 35



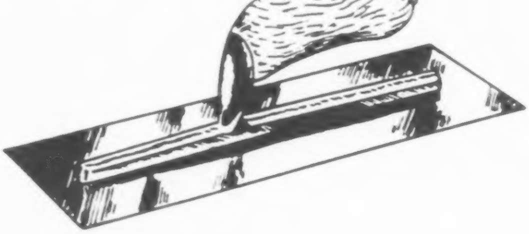
- — Margin — mixing mortar, grout, and waterproofing materials in small amounts

FIGURE 36



- — Plastering — plastering and parging mortar or waterproofing onto walls; applying base coat for tile and veneer

FIGURE 37



- **Miscellaneous Equipment**

  - — Brick tongs
  - — Mortar box

FIGURE 38

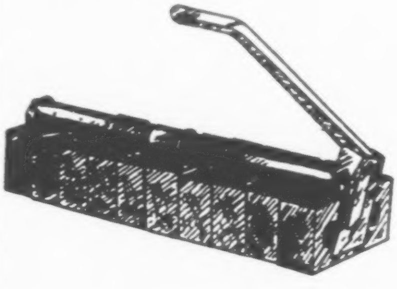
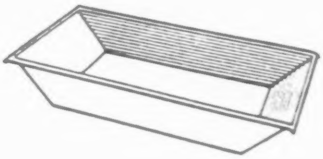
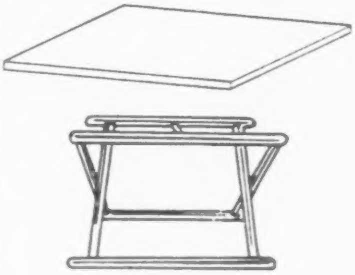


FIGURE 39



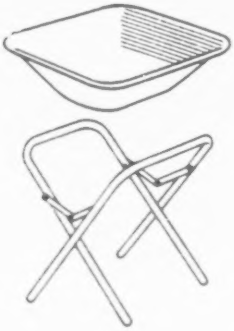
— Mortarboard and stand

FIGURE 40



— Mortar pan and stand

FIGURE 41

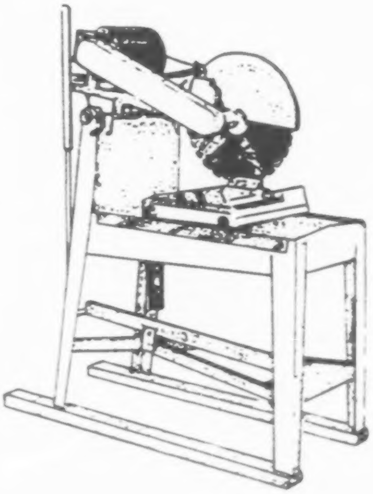


OBJECTIVE 3

Given illustrations, identify types of power tools used in bricklaying.

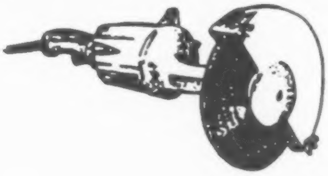
- Masonry saw — cutting masonry units
  - — Stationary

FIGURE 42



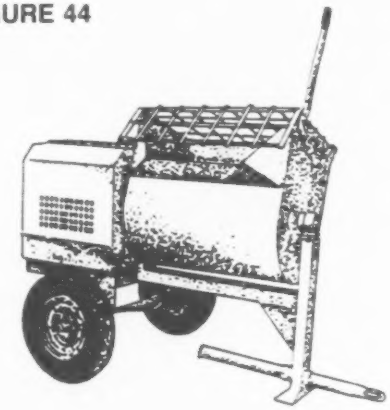
- Tuck-pointer grinder — removing mortar from joints and cutting reglats

FIGURE 43



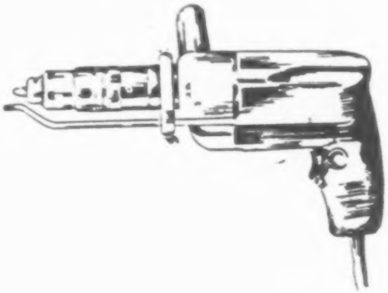
- Mortar mixer — mixing mortar

FIGURE 44



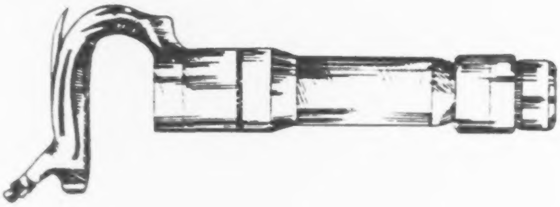
- Hammer drill — drilling holes

FIGURE 45



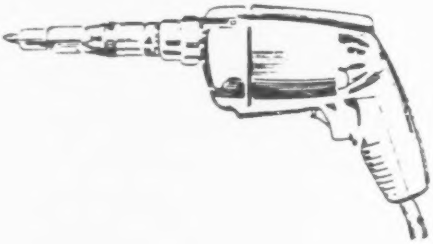
— Air hammer — chipping

FIGURE 46



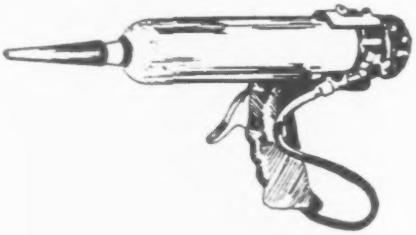
— Drywall screwdriver — attaching anchors and ties

FIGURE 47



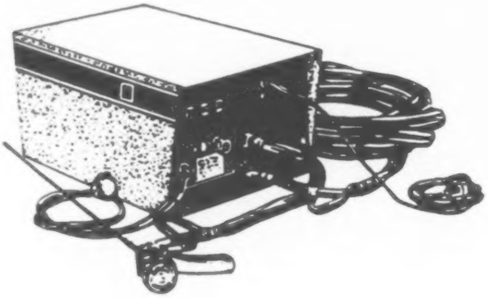
— Pneumatic caulking gun — applying caulking and sealants

FIGURE 48



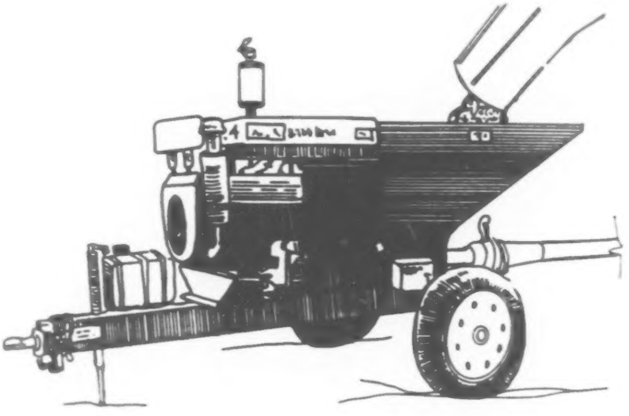
- Pressure cleaner — washing masonry and cleaning equipment

FIGURE 49



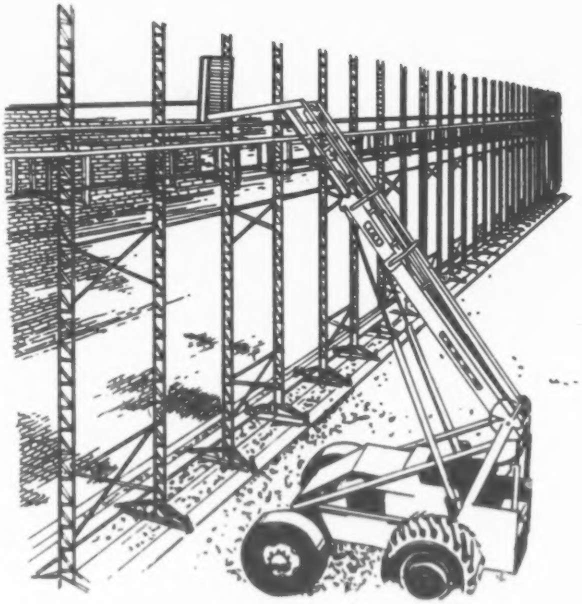
- Grout pump — pumping grout to difficult locations such as multi-storied buildings

FIGURE 50



— Mason's adjustable scaffold

FIGURE 51



OBJECTIVE 4

Use a brick trowel correctly.

INTRODUCTION

This exercise allows you to practice the skill of properly using a brick trowel to spread mortar. Using a trowel correctly is a required skill in bricklaying and the skills learned in this exercise will be valuable throughout your career as a bricklayer.

TOOLS AND EQUIPMENT

- Brick trowel
- Mortarboard and stand
- Laboratory mortar
- Bucket of water
- Shovel
- 2 x 4 lumber 3′ - 4′ in length
- Goggles and hardhat

PROCEDURE

Functional Reading Skills
- Follow written instructions

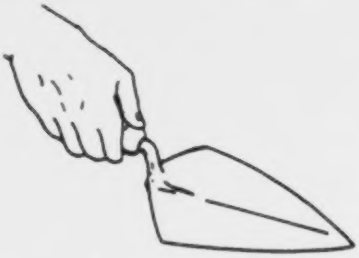
Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

	Yes	No
• Hold a brick trowel correctly.		
1. Put on hardhat and goggles.	___	___
2. Grasp handle of brick trowel with fingers on underside of handle.	___	___

Yes No

3. Place thumb on top of ferrule, pointing toward tip of blade. ___ ___

FIGURE 52



4. Hold handle with a firm, yet flexible, grip. ___ ___

5. Apply pressure between thumb and forefinger. ___ ___

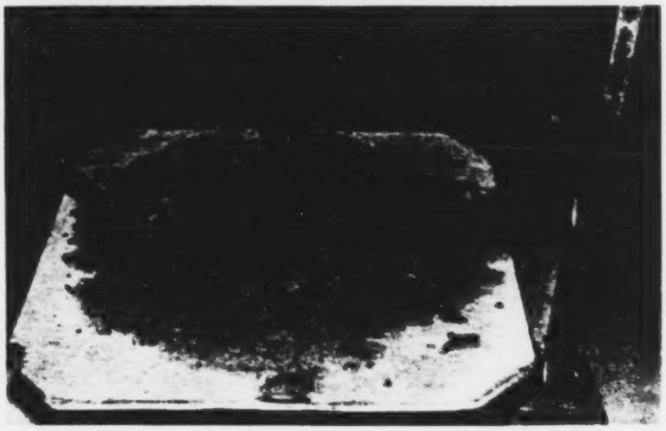
- Prepare mortar

  1. Position mortarboard on stand. ___ ___

  2. Wet mortarboard. ___ ___

  3. Place mortar in center of board. ___ ___

FIGURE 53



Yes No

4. Place 2 × 4 approximately 2 feet from mortarboard. ___ ___

FIGURE 54

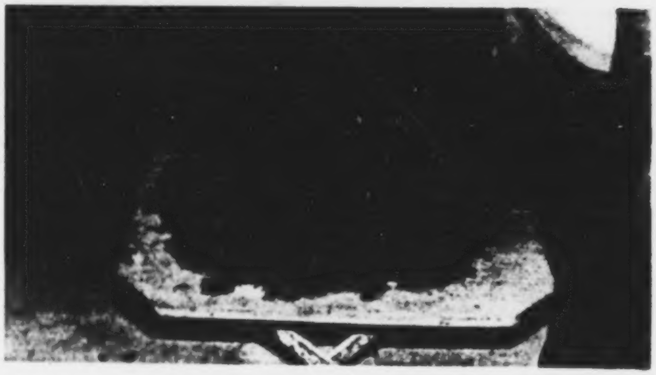
5. Pick up trowel; hold trowel firmly but with a relaxed grip. ___ ___

FIGURE 55

6. Move trowel in hand until it feels comfortable and proper grip and movement are obtained. ___ ___

	Yes	No
7. Cut out a trowel of mortar from side of mortarboard.	___	___
NOTE: Repeat steps until you have the feel of the trowel containing mortar.	___	___

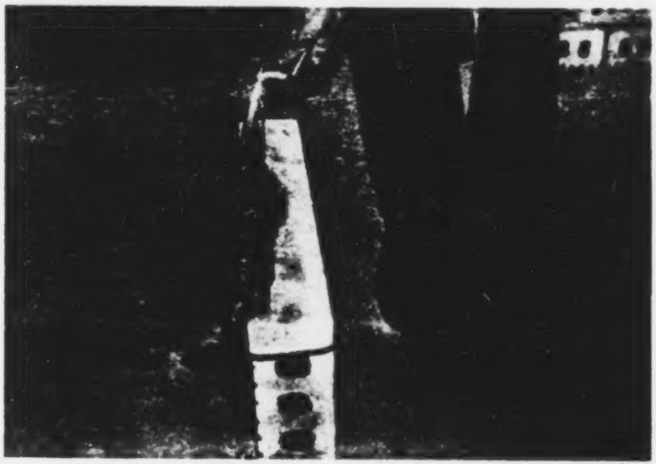
FIGURE 56



- Spread mortar

	Yes	No
1. Pick up a trowel of mortar, and spread about 16 inches of mortar on 2 × 4	___	___

FIGURE 57



	Yes	No
2. Continue picking up mortar and spreading it until 2 × 4 is covered.	___	___
NOTE: Avoid waste and keep the mortar thickness constant.	___	___

FIGURE 58

	Yes	No
3. Spread a solid bed joint with little or no furrowing.	___	___
4. When bed joint is spread satisfactorily, have instructor evaluate.	___	___
5. Remove mortar and place on mortarboard.	___	___
6. Temper mortar, if needed, to keep same consistency.	___	___
7. Clean trowel.		

	Yes	No
8. Repeat procedure.	___	___
9. Have instructor inspect your work.	___	___
10. Clean work area; clean and put away all tools and equipment.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Wet mortarboard	4	3	2	1
Trowel held correctly	4	3	2	1
Mortar picked up correctly	4	3	2	1
Bed with no furrowing	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training

3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required

2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill

1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 2 BRICKLAYING TOOLS A 2

OBJECTIVE 5

Using common bricklaying hand tools, cut brick and block.

INTRODUCTION

During this exercise you will practice skills using hand tools to measure, mark, and safely cut brick and block.

TOOLS AND EQUIPMENT

- Brick hammer
- Brick set
- Rule or tape
- Crayon or pencil
- Brick
- Block
- Safety goggles and hardhat
- Combination square

PROCEDURE

Functional Reading Skills
- Follow written instructions

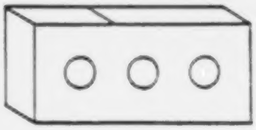
Job Acquisition/ Development Skills
- Master specific job task/procedure

General Science Skills
- Use scientific instruments (type)

- Cutting brick — Yes No

1. Put on safety equipment and mark face of brick where it is to be cut. ___ ___

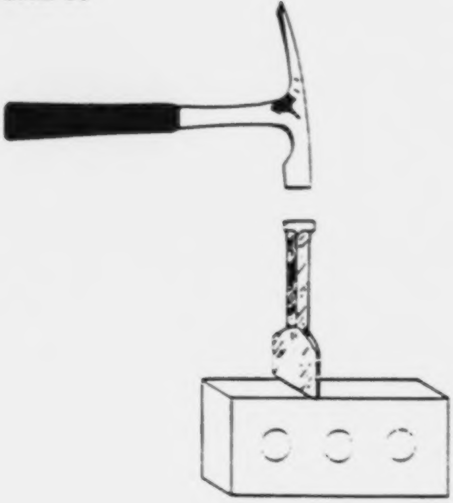
FIGURE 59



votech

	Yes	No
2. Place brick on smooth, cushioned surface with marked face up.	___	___
NOTE: Never place brick on a hard surface for cutting.		
3. Place brick set on mark on brick; hold vertically with flat side of blade facing direction of finished cut.	___	___

FIGURE 60



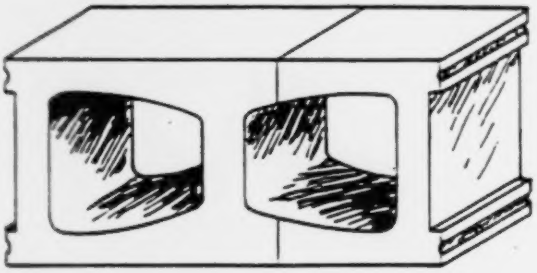
	Yes	No
4. With brick hammer, strike brick set a light blow, just enough to score brick.	___	___
5. Turn brick to opposite side and repeat procedure.	___	___

	Yes	No
6. Continue turning and scoring until brick is scored on all four sides.	___	___
NOTE: Some bricks do not have to be scored on all four sides.		
7. Turn brick so that face is up.	___	___
8. Place brick set vertically on scored mark; strike brick set sharply with hammer.	___	___
NOTE: The brick should break cleanly along the scored line.		

- Cutting Block

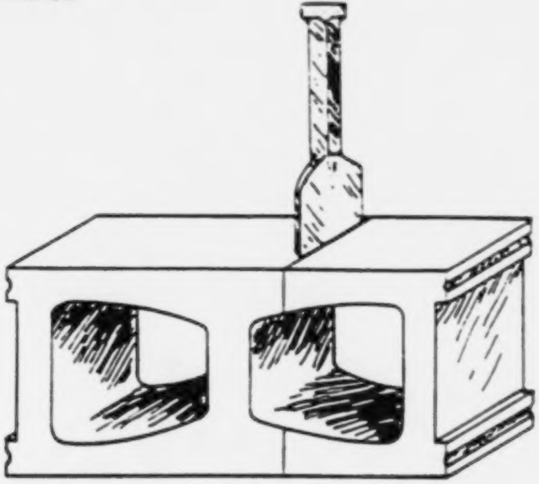
	Yes	No
1. Mark face of block where it is to be cut.	___	___
2. Use square to transfer mark to other three sides of the block.	___	___

FIGURE 61



	Yes	No
3. Place block on smooth, cushioned surface with face up	___	___
NOTE: Never place block on a hard surface for cutting.		
4. Place brick set vertically on mark on block, with flat side of blade facing direction of finished cut.	___	___

FIGURE 62



	Yes	No
5. With brick hammer, strike brick set a light blow, just enough to score block.	___	___
NOTE: Do not strike brick set too hard before scoring all four sides of the block.		
6. Turn block completely over; use same procedure to score this side.	___	___

	Yes	No
7. Score sides of block using same procedure.	___	___
8. Turn block again so that face is up	___	___
9. Position brick set on scored mark; hold chisel firmly, and strike brick set sharply with hammer.	___	___
NOTE: Block should break cleanly along scored line.		
10. Have instructor inspect your work.	___	___
11. Clean work area; clean and put away all tools and equipment.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Brick/block marked properly	4	3	2	1
Brick scored	4	3	2	1
Brick breaks cleanly	4	3	2	1
Used square to mark block	4	3	2	1
Block breaks cleanly	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

OBJECTIVE 6

Use a level.

INTRODUCTION

Using a level is a simple but critical skill in bricklaying. Bricklayers must check levels for accuracy and use them to level horizontal surfaces, and plumb vertical surfaces.

TOOLS AND EQUIPMENT

- Levels, various lengths
- Vertical and horizontal work surfaces
- Pencil
- Tape
- Straightedge

PROCEDURE

Functional Reading Skills
- Follow written instructions

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

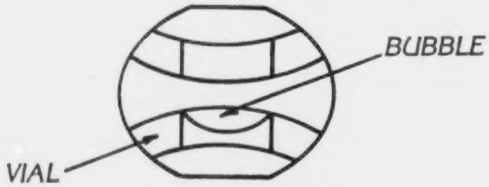
LEVELING	Yes	No
• Check level for accuracy.	___	___
NOTE: Levels are very delicate instruments and must be handled carefully to ensure accuracy. Levels should be checked for accuracy before use, especially before use, especially if the instrument has been dropped or jarred.		
1. Set base of level on flat, horizontal surface.	___	___
2. Check bubble position in horizontal vial.	___	___

Yes No

3. Adjust surface or location of level until bubble is centered; mark position on surface. ___ ___

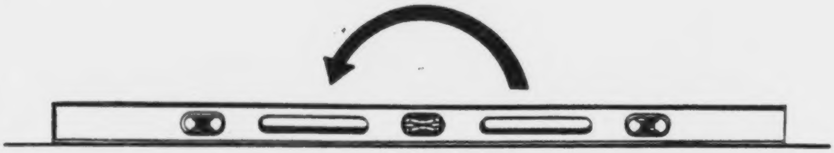
NOTE: On a level surface, the bubble will lie evenly positioned between the lines on the vial.

FIGURE 63



4. Rotate the level end-for-end and position it in the exact location as the bubble-centered reading. ___ ___

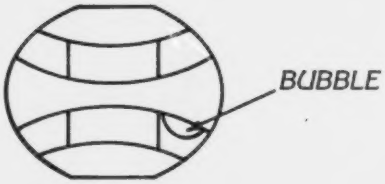
FIGURE 64



5. Check bubble position in the horizontal vial. The bubble will be centered from this side also if the level is accurate. ___ ___

	Yes	No
6. Replace or repair level as necessary.	___	___
7. Have instructor check your work.	___	___
• Level a surface		
1. Visually check surface for irregularities and foreign matter such as dirt. Even small surface irregularities or particles can cause inaccurate readings on the level.	___	___
2. Clean or replace surface as necessary.	___	___
3. Set base of level carefully and squarely on surface.	___	___
4. Check bubble position. The bubble will be displaced toward the high end of the level.	___	___

FIGURE 65



	Yes	No
5. Adjust surface as necessary.	___	___

	Yes	No
6. Take additional readings to level surface as required. Many factors affect the number of readings required. These include type of surface, material being used, and others.	___	___
7. Have instructor check your work.	___	___
PLUMBING		
• Check level for accuracy.		
1. Place base of level against flat, vertical surface (See Figure 66).	___	___
2. Check bubble position in upper horizontal vial.	___	___
3. Adjust surface or location of level until bubble is centered; mark position on surface.	___	___
4. Rotate level end-for-end and position it in the exact location as that of the bubble-centered reading (Figure 67).	___	___

FIGURE 66

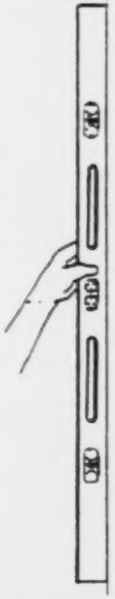
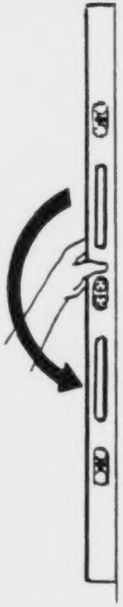
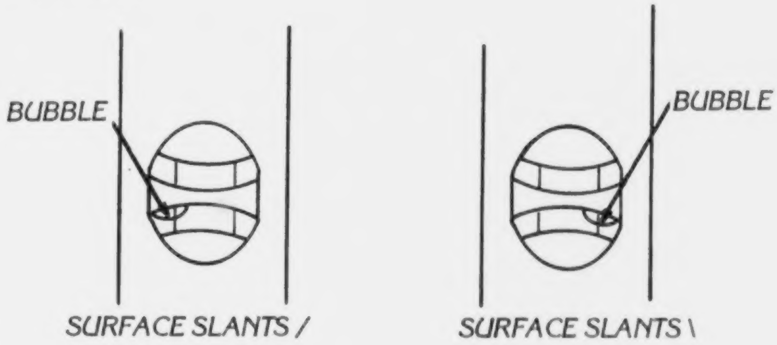


FIGURE 67



	Yes	No
5. Check bubble position in the upper horizontal vial.	___	___
NOTE: The bubble will be centered at this end also if level is accurate.	___	___
6. Replace or repair level as necessary.	___	___
7. Have instructor check your work.	___	___
• Plumb a surface		
1. Visually check surface for irregularities and foreign matter such as dirt.	___	___
2. Clean or replace surface as necessary.	___	___
3. Place base of level carefully and squarely against surface.	___	___
4. Check bubble position in upper vial. The bubble will move toward one end of the vial if the surface is not plumb. To plumb the surface, you must adjust it in the direction of bubble displacement.	___	___

FIGURE 68



	Yes	No
5. Adjust surface as necessary.	___	___
6. Take additional readings to plumb as required.	___	___
7. Ask your instructor to check your work.	___	___
8. Clean work area; put away tools and equipment.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Level handled carefully	4	3	2	1
Level properly used	4	3	2	1
Created level surface	4	3	2	1
Created a plumb surface	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
2 **Limited Skill** — Has performed job during training program; additional training is required to develop skill
1 **Unskilled** — Is familiar with process, but is unable to perform job

OBJECTIVE 7

Use a brick spacing rule.

INTRODUCTION

A brick spacing rule is used to lay out the height of brick courses. The rule has regular inch spacing on one side and special measuring marks for the course height on the other.

TOOLS AND EQUIPMENT

- Level
- Pencil
- Tape
- Straightedge
- Goggles and hardhat
- Laboratory mortar and mortarboard
- Brick spacing rule
- Building plans (optional)
- Bricks (15 to 20)

PROCEDURE

Functional Reading Skills
- Follow written instructions

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

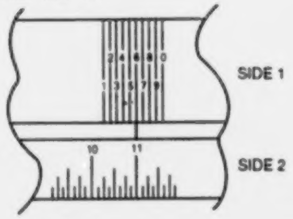
	Yes	No
1. Put on safety equipment.	___	___
2. Use the building plans or check with your instructor to determine the number of courses that are specified in a given number of inches.	___	___
For this example, there will be 4 courses in 11″.	___	___
3. Find 11″ on the regular inch side of the rule (side 2 in Figure 68).	___	___

Yes No

4. Turn the rule over and locate the spacing number "6" directly behind the 11" mark (Figure 68).

___ ___

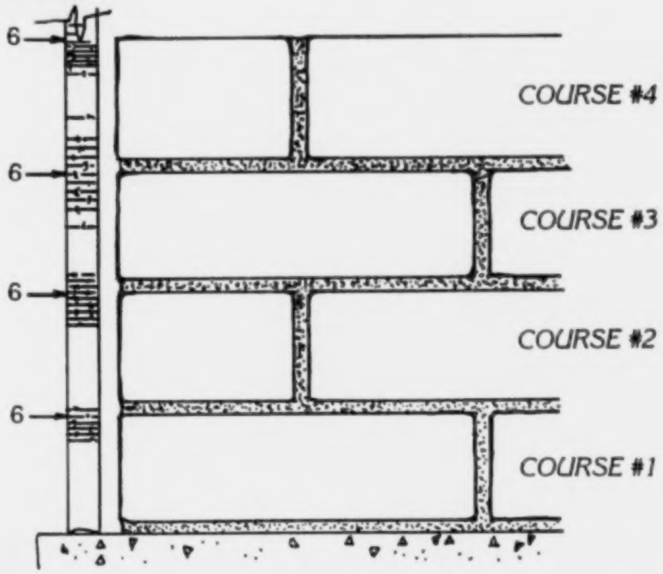
FIGURE 68 A



5. This number will be used to establish the height of each course (Figure 69).

___ ___

FIGURE 69



NOTE: Notice that the larger red numbers on side 1 of the rule are the course numbers.

	Yes	No
6. To practice use of the rule		
a. Using a tape and straightedge, mark a 3′ straight line along the shop/lab floor.	___	___
b. Using your trowel, lay a bed of laboratory mortar along the marked line.	___	___
c. Construct a short 4-course brick wall using the brick spacing rule. Use Figure 69 as an example.	___	___
d. Use a level to ensure courses are both level and plumb.	___	___
7. This concludes this job sheet. Ask your instructor to evaluate your work.	___	___
8. Clean up your work area.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS ______________________________________

____

____

votech

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Wall level (± 1/16")	4	3	2	1
Wall plumb (±1/16")	4	3	2	1
Course at height (±1/16")	4	3	2	1
Wall straight (±1/16")	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
2 **Limited Skill** — Has performed job during training program; additional training is required to develop skill
1 **Unskilled** — Is familiar with process, but is unable to perform job

WRITTEN TEST

BRICKLAYING TOOLS

A 2

Name ______________________ Score _________

OBJECTIVE 1

Given a list of terms associated with bricklaying tools, match them to their correct definitions. Write the letter that corresponds to the most correct answer.

_____ 1. What is the term to describe the metal band around the handle of a trowel?

a. Ring band
b. Trowel band
c. Temper
d. Ferrule

_____ 2. Which of the following terms describes small tool used to support a mason's line at the center of a wall?

a. Parge
b. Twig
c. Hawk
d. Rake pin

_____ 3. The metal device used for securing mason's line at both ends of the course line is called

a. line pin
b. ferrule
c. hod
d. twig

_____ 4. A tool used to measure the spacing of course heights using modular materials is called

a. brick spacing rule
b. rake
c. modular rule
[illegible] brick tong

May be photocopied for student use.

_____ 5. A mortarboard is used to

a. cover openings in concrete walls
b. strike-off excess mortar
c. hold mortar
d. mix mortar

_____ 6. What is the name of the tool used to carry several bricks?

a. Brick rods
b. Rakes
c. Hawk carriers
d. Brick tongs

_____ 7. Applying a thin coating of mortar or plaster to masonry is called

a. parge or parging
b. tempering
c. scaling
d. rake or raking

_____ 8. A special shaped tool used to finish masonry joints is called

a. finisher
b. jointer
c. hawk
d. parge trowel

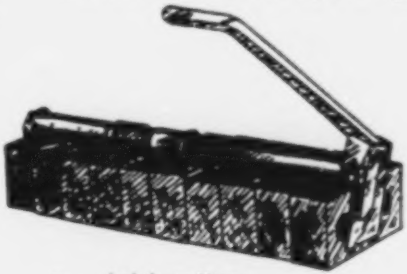
_____ 9. The groove or slot in a wall where flashing is inserted is a

a. ferrule
b. ring band
c. reglet
d. hawk

May be photocopied for student use

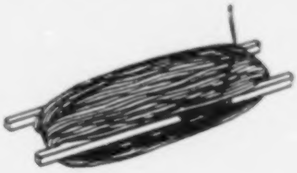
OBJECTIVE 2 **Provided drawings, identify various types of hand tools used in bricklaying.**

_____ 1. The tool represented by the figure below is a



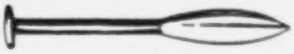
a. brick cutters
b. brick tongs
c. corner blocks
d. brick spreader

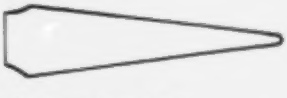
_____ 2. The following figure shows a



a. mason's line
b. chalk box
c. lifter line
d. line level

_____ 3. What is the name of the tools shown below?

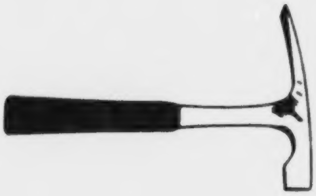




a. Concrete nails
b. Mason spikes
c. Line pins
d. Level shims

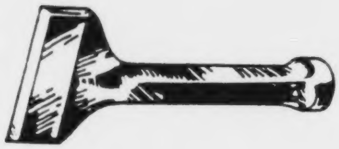
May be photocopied for student use.

_____ 4. The hammer illustrated below is a



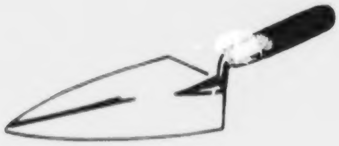
a. tile
b. mash
c. brick
d. framing

_____ 5. The tool shown below is best known as



a. tooth chisel
b. wood chisel
c. mason's chisel
d. brick set

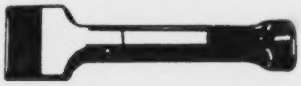
_____ 6. What is the tool shown in the drawing below?



a. Pointing trowel
b. Brick trowel
c. Margin trowel
d. Plastering trowel

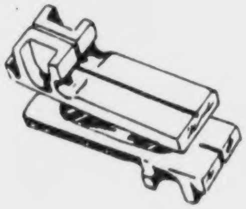
May be photocopied for student use

_____ 7. For sizing, trimming, and facing hard stone or cutting heavy stone, the correct tool would be a



a. pitching tool
b. tooth chisel
c. mason's chisel
d. plugging chisel

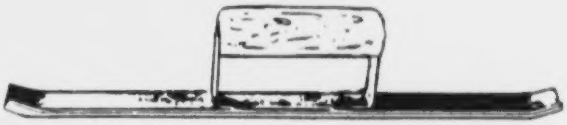
_____ 8. The tool shown below is a



a. line block
b. corner block
c. line pin
d. line twig

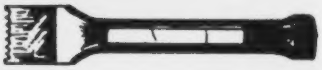
May be photocopied for student use.

_____ 9. The tool below, used for shaping joints, is called a



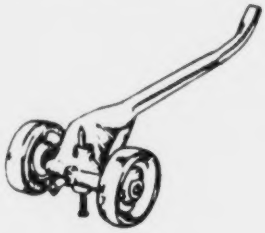
a. concave jointer
b. sled runner
c. V-jointer
d. caulking trowel

_____10. For cutting soft stone, the correct tool is a



a. jointer
b. tooth chisel
c. rake
d. hand saw

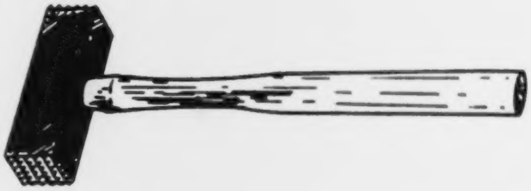
_____11. The tool used for creating attractive joint designs is a



a. flat jointer
b. concave jointer
c. rake
d. margin

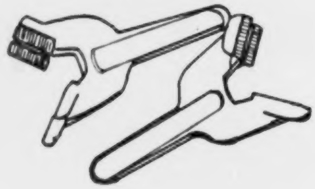
May be photocopied for student use.

_____12. The tool used for facing block or stone is a



a. brick hammer
b. stonemason's hammer
c. mash
d. bush hammer

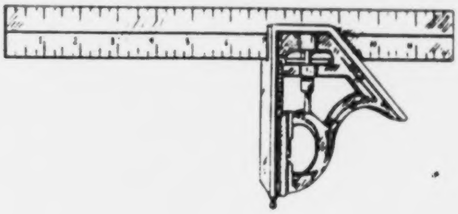
_____13. These tools are



a. line blocks
b. corner blocks
c. jointers
d. rakes

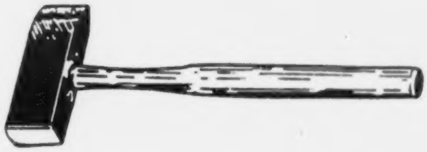
May be photocopied for student use.

_____14. The tool used for marking straight cuts or angles is a



a. mason's square
b. combination square
c. framing square
d. bevel square

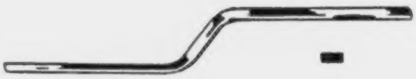
_____15. The hammer shown here is known as a



a. brick hammer
b. stonemason's hammer
c. mash
d. bush hammer

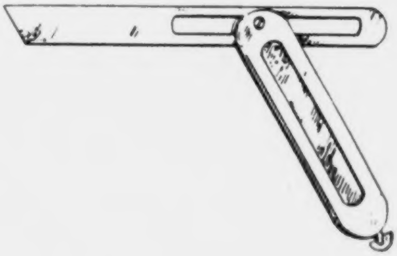
May be photocopied for student use

_____16. The shape of this jointer is



a. V-shape
b. sled-runner
c. concave
d. flat

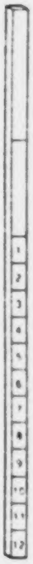
_____17. This tool used for marking various angles is a



a. mason's square
b. combination square
c. framing square
d. bevel square

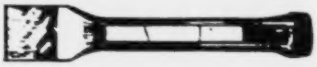
May be photocopied for student use.

_____18. The tool shown here is a



a. brick spacing rule
b. corner pole
c. story pole
d. framing pole

_____19. The chisel used for cutting brick, block, and veined stone is the

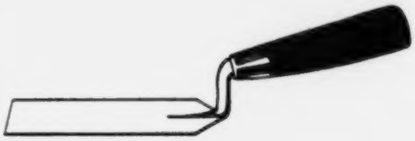


a. rubber-grip mason's
b. brick set
c. pitching
d. mason's

May be photocopied for student use

votech

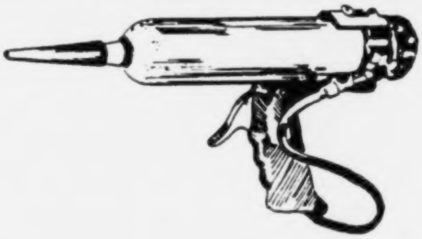
_____20. The tool for mixing mortar, grout, and waterproofing materials in small amounts is a



a. margin
b. spreading
c. caulking
d. pointing

OBJECTIVE 3 **Given illustrations, identify selected types of power tools used in bricklaying.**

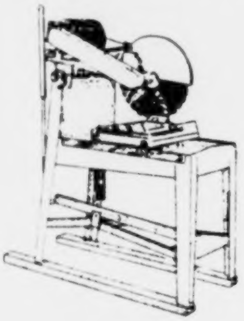
_____ 1. The power tool shown below is called



a. pneumatic caulking gun
b. air hammer
c. drywall screwdriver
d. mortar gun

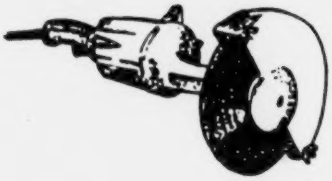
May be photocopied for student use.

_____ 2. What is the name of the power tool shown below?



- a. Stationary masonry saw
- b. Power brick saw
- c. Masonry grinder
- d. Portable masonry saw

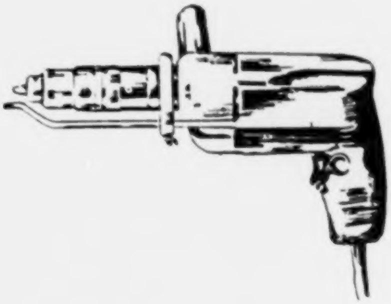
_____ 3. The best title of the tool shown in the illustration below is a



- a. power masonry cutter
- b. tuck-pointer grinder
- c. joint grinder
- d. diamond-bladed saw

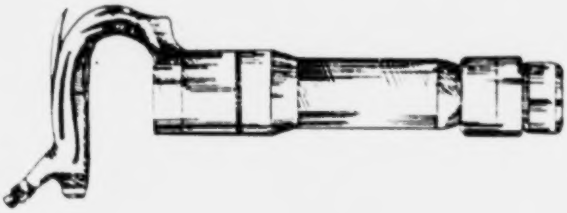
May be photocopied for student use

_____ 4. This power tool is a



a. pneumatic caulking gun
b. hammer drill
c. mortar gun
d. air hammer

_____ 5. This tool, used for chipping, is a



a. power masonry cutter
b. pneumatic chipping gun
c. drywall screwdriver
d. air hammer

NOTE: Objectives 4-7 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

BRICKLAYING TOOLS

A 2

OBJECTIVE 1

1. d
2. b
3. a
4. c
5. d
6. d
7. a
8. b
9. c

OBJECTIVE 2

1. b
2. a
3. c
4. c
5. d
6. b
7. a
8. a
9. d
10. b
11. c
12. d
13. b
14. b
15. b
16. d
17. d
18. c
19. d
20. a

OBJECTIVE 3

1. a
2. a
3. b
4. b
5. d

OBJECTIVE SHEET | *APPLIED SKILLS* A 3

INTRODUCTION

This unit will introduce you to the many skills required to lay out and construct brick and block walls.

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVE

After completing this unit, the student will be able to lay out and build a brick and block wall. The student will demonstrate these competencies by completing the job sheets and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to show the ability to:

1. Given a list of terms associated with layout and application of skills for bricklaying, match them to their correct definitions.
2. Name methods of strengthening walls by joining the inner and outer wythes.
3. Discriminate between proper and improper methods for laying brick and block.
4. Lay out and construct a section of masonry wall. (Job Sheet 1)
5. Build a 90-degree brick lead. (Job Sheet 2)

PREPARATION

- Review unit and plan presentation.
- Order or obtain materials to supplement unit.
- Give an overview of the course, explaining the organization of the materials from the foundation to the finished house.
- Introduce unit.

DELIVERY

Objective 1: Given a list of terms associated with layout and application of skills for bricklaying, match them to their correct definitions.

- Explain that understanding these terms will provide a foundation necessary to develop skills in bricklaying.
- Show as many samples of the actual items as possible.

Objective 2: Name methods of strengthening walls by joining the inner and outer wythes.

- Explain that the information sheets provide examples of wall strengthening methods. Many other methods are used based on the structural design and type of masonry units used.

Objective 3: Discriminate between methods for laying brick and block.

- Show the video, *Basic Masonry: Spreading Mortar.*
- Show the video, *Basic Masonry: Building a Corner.*
- Discuss the importance of wearing safety equipment when bricklaying. Emphasize proper lifting techniques, eye safety, wearing a hardhat, and foot safety (hard-toed boots). Refer to the "Construction Safety" unit in the *Fundamentals of Construction* manual.

APPLICATION

Objective 4: Lay out and construct a section of masonry wall. (Job Sheet 1)

- Assign students to complete Job Sheet 1.

Objective 5: Build a 90-degree brick lead. (Job Sheet 2)

- Assign students to complete Job Sheet 2.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements from pretest results.
- Counsel students individually on pretest results and study requirements.
- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on assignment sheet activities.
- Evaluate students on job sheet activities.
- Complete appropriate section of competency profiles.
- Reteach and reevaluate if necessary.
- Modify materials in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Complete appropriate sections of competency profiles.

- Reteach and retest if necessary.

- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Basic Masonry: Spreading Mortar.**

- *Basic Masonry: Building a Corner.**

*These two videos are available from the Oklahoma Department of Vocational and Technical Education, Resource Center, 1500 West Seventh Avenue, Stillwater, Oklahoma 74074-4364, 800-522-5810.

UNIT REFERENCES

- Kreh, R. T., Sr. *Masonry Skills.* Albany, New York: Delmar Publishers, Inc., 1982.

- *Masonry Skills.* available from Delmar Publishers, Inc., 2 Computer Drive, West, Box 15-015, Albany, New York, 12212.

- Toenjes, Leonard P. *Building Trades Dictionary,* American Technical Publications, Inc., Homewood, IL. 1989.

- Willey, Al. *Brick and Block Masonry.* Stillwater, Oklahoma: Oklahoma Department of Vocational and Technical Education, Curriculum and Instructional Materials Center and The Associated General Contractors of America, 1992.

OBJECTIVE 1

Given a list of terms associated with layout and application of skills for bricklaying, match them to their correct definitions.

- **bed joint** — horizontal mortar joint between two units or courses
- **block or brick leads** — sections of wall built up and racked back on successive courses; used to attach line as guide for constructing wall between them
- **brick bond** — pattern in which bricks are laid
- **cavity** — air space or opening between two wythes of masonry units
- **closure** — last unit laid in a course
- **consistency** — relative mobility, or ability of fresh mortar to flow
- **deadman** — object to which the line is attached for lead or first course

  NOTE: A deadman could be a pole, brace, or even another block.

- **dry bond** — method of determining brick spacing by laying brick without mortar
- **ferrule** — metal cap around handle of brick trowel at shank end
- **frog** — depression, such as a groove or recess, in one or both of the larger sides of a brick or block; provides key for mortar at joints to strengthen bonding
- **furrow** — slight indentation made in bed joint mortar

- **grout** — a mixture of cement, aggregate, and water with a consistency that allows it to flow easily
- **grouted masonry** — masonry in which the cell is filled with grout
- **head joint** — vertical mortar joint between two units
- **keel** — construction crayon
- **level** — aligned with the horizon; parallel to the horizontal plane
- **lintel** — horizontal member placed over all openings to support the weight of masonry above
- **load-bearing wall** — wall that not only supports itself, but the structure above
- **mortar** — mixture of lime, sand, and water
- **mortar body** — consistency or density of mortar that is plastic and workable
- **non-load-bearing wall** — wall that supports only its own weight
- **parging** — plastering masonry walls with mortar
- **plumb** — perfect vertical plane
- **rack** — to set back the end of each course from the end of the preceding course; the brick or block resemble stairs.
- **racking back** — method of stepping back successive courses
- **reinforced masonry** — unit of masonry with embedded reinforcement to give additional strength to wall
- **scaffold** — temporary structure or platform to support workers and material during construction

- **spreading mortar** — process of placing mortar for the course to be laid
- **story pole** — length of wood marked for course levels and/or heights and openings
- **strike** — to shape or tool mortar joints
- **temper** — to remix mortar to proper consistency
- **through-wall bonding** — method of bonding by joining outer and inner walls
- **through-wall flashing** — pieces of sheet metal installed to prevent water from penetrating
- **weep holes** — small holes in a masonry wall that allow moisture to pass
- **wythe** — continuous section of masonry, one unit thick

OBJECTIVE 2

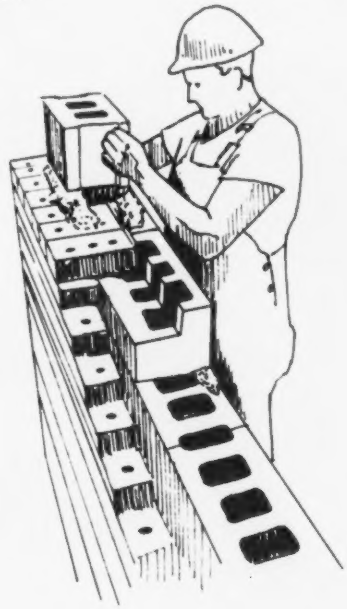
From alternatives, choose the correct method to strengthen walls.

INTRODUCTION

The pattern or bonding of masonry units greatly add to the strength of a masonry wall. There are other bonding methods that strengthen the wall by joining the outer and inner wythes. They include constructing a header, using metal ties, and using grout. The following are examples of these methods.

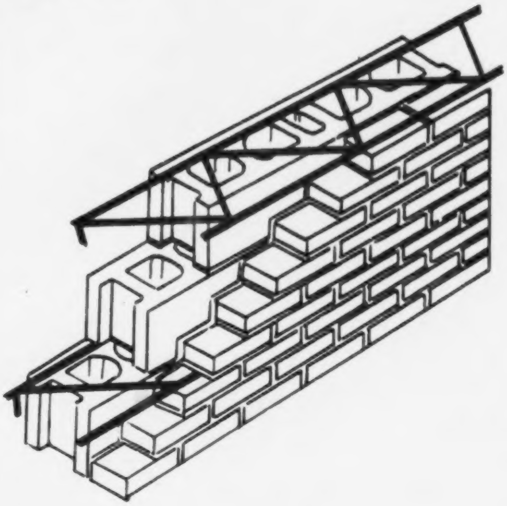
- Header construction

FIGURE 1



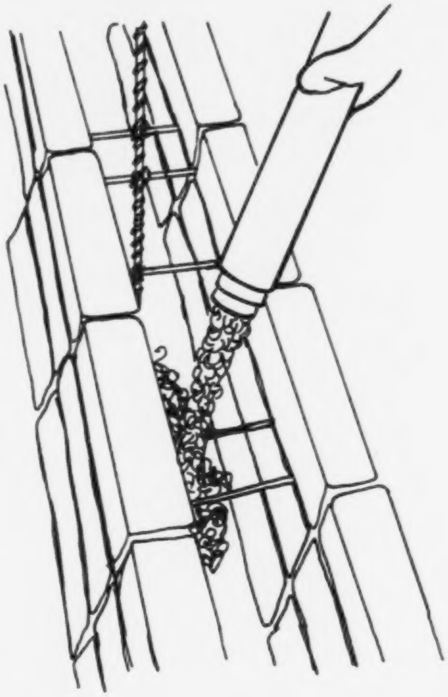
- Joint reinforcement or heavy-gauge ties

FIGURE 2



- Grouting and reinforcement

FIGURE 3



OBJECTIVE 3

Discriminate between proper and improper methods for laying brick and block.

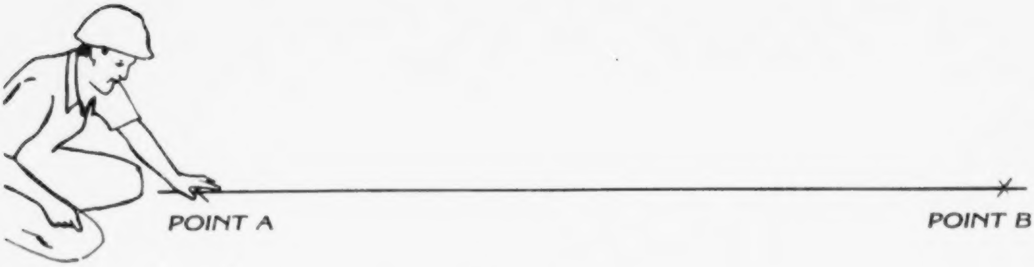
INTRODUCTION

Laying brick and block consists of laying out a wall, picking up and placing mortar, alignment of masonry units, striking mortar joints, and cleaning masonry.

- Laying out a wall
  - — Establish wall line
    1. Locate known reference points.

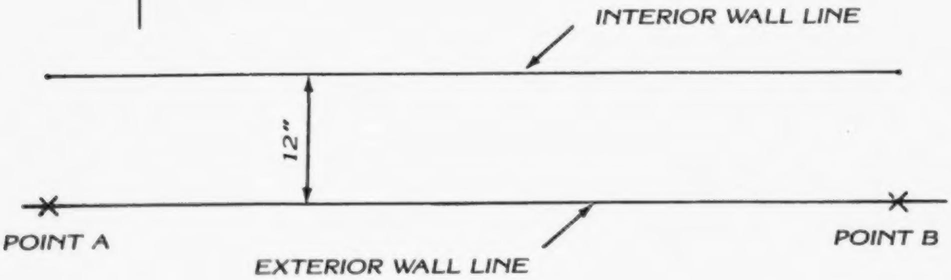
2. Snap a chalk line from point A to point B to establish the exterior wall line.

FIGURE 4



3. Establish interior wall line by measuring a distance of 12 inches from points A and B on exterior wall line. The interior wall line should parallel the exterior wall line.

FIGURE 5

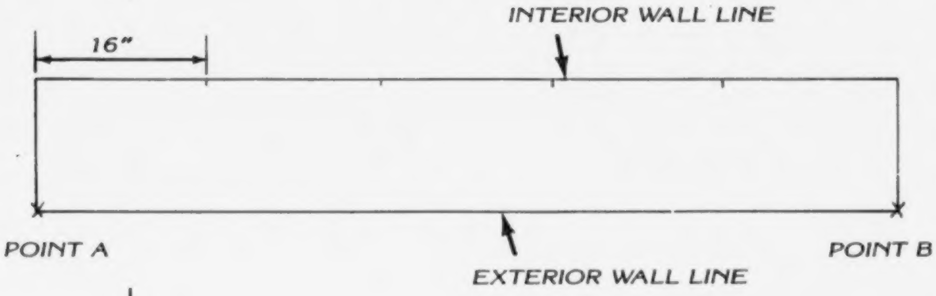


4. Establish both ends of wall by squaring end lines between interior and exterior wall lines at points A and B.

5. With steel tape, measure and mark every 16 inches on interior wall line.

   These marks indicate the joint locations.

FIGURE 6



6. Another popular method to determine masonry unit spacing is to use the dry bonding method. Without using mortar, the brick or block is positioned and then marked on the wall line.

FIGURE 7

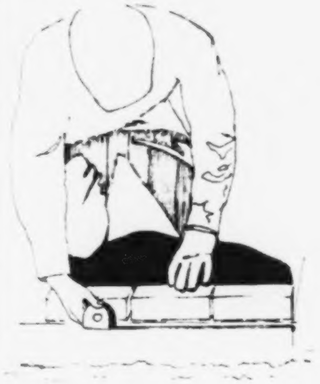
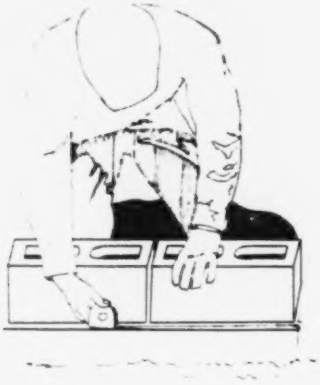


FIGURE 8

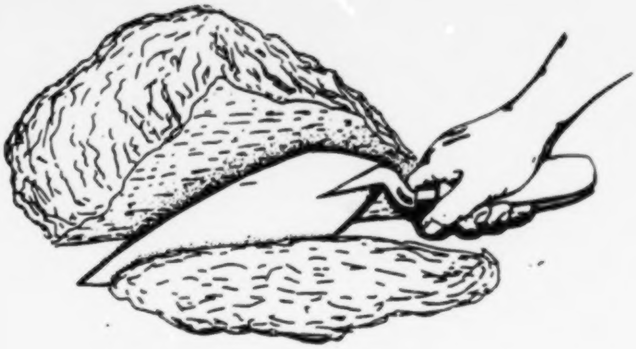


- Picking up and placing mortar
  - Cupping method

    This method is the most widely used to pick up mortar.

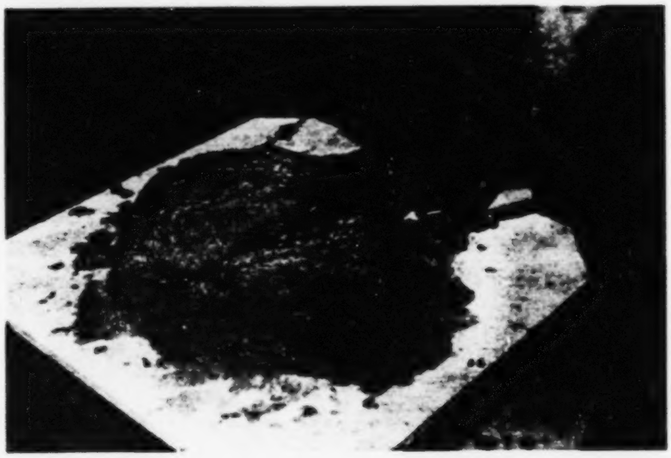
    1. Use a downward slicing motion of trowel to separate a portion of mortar from main pile.

FIGURE 9



2. Use a rolling motion to move the mortar to edge of mortarboard.

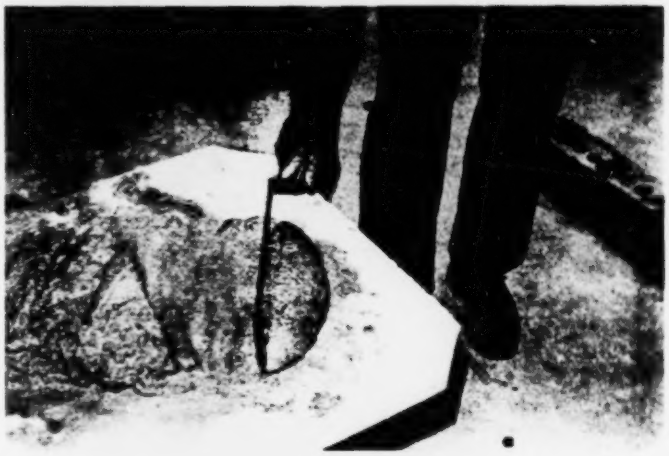
FIGURE 10



3. Use trowel to work mortar into a long, tapered shape.

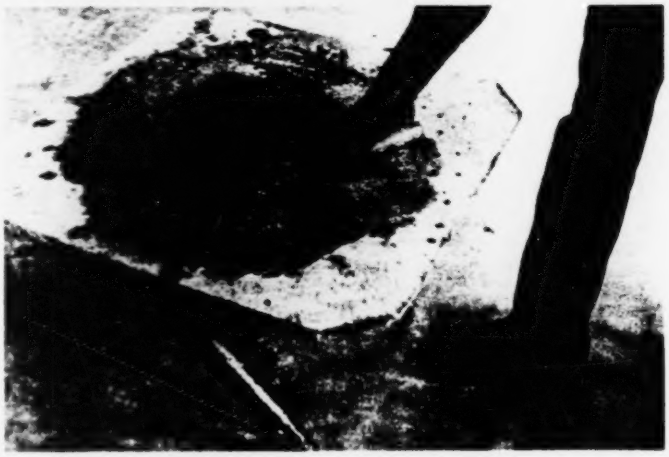
This is a convenient shape to pick up.

FIGURE 11



4. Hold trowel flat against mortarboard, and slide it forward under the small pile of mortar.

FIGURE 12



5. While pushing forward, lift mortar with an upward motion of trowel.

   With this motion, the trowel lifts the mortar free of the mortarboard.

6. Snap your wrist when picking up mortar. This will set mortar on the trowel to keep it from falling off.

   NOTE: Snapping the wrist is one of the most important and difficult steps to master when picking up mortar.

7. Establish the direction of travel you will use in placing mortar.

   a. Right-handed person

      1) Spreads and places masonry units from left to right

      2) Moves backwards

   b. Left-handed person

      1) Spreads and places masonry units from right to left

      2) Moves backwards

8. With your trowel now loaded, keep elbow slightly away from body. When elbow is held slightly away from body, movement of the trowel hand is not restricted.

9. Use a sweeping motion to spread mortar.

10. Fill any spaces in bed joint with excess mortar.

11. Butter and lay masonry units.

    NOTE: Once a masonry unit is buttered and placed, it should only be positioned. It should never be lifted out of place entirely without rebuttering.

b. Block must be dry before buttering. Bricks can be dry or wet.

c. There are three methods commonly used to lay masonry units:

1) Laying to hand

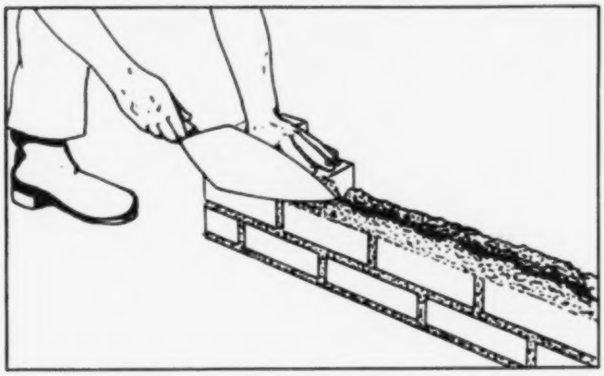
2) Laying backhand

3) Laying overhand

— Laying to hand

NOTE: Bricklayer walks forward.

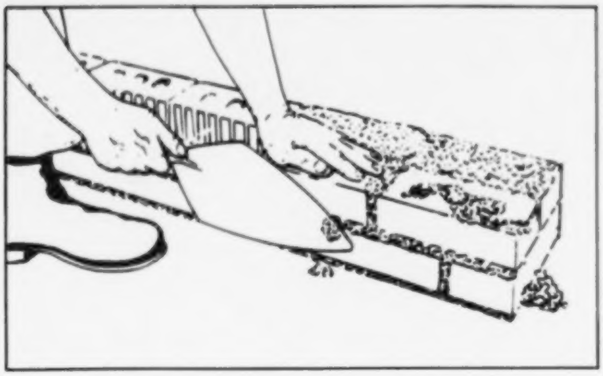
FIGURE 13



— Laying backhand or against hand

NOTE: Bricklayer walks backward.

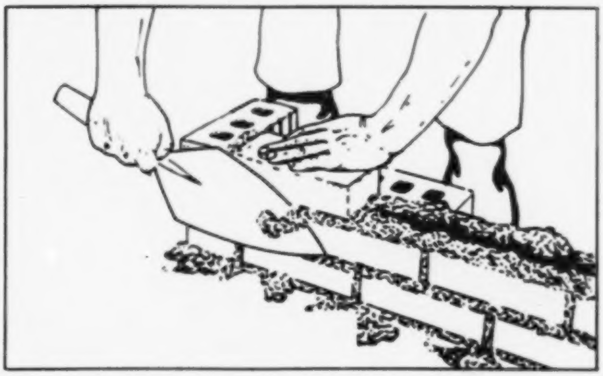
FIGURE 14



— Laying overhand

NOTE: This method is used when laying units on the outside working from the inside. The bricklayer also lays to or against hand when laying brick overhand.

FIGURE 15

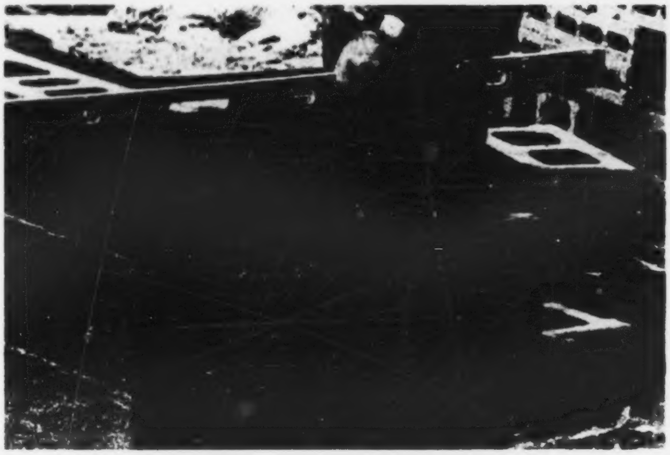


- Aligning of masonry units

  The proper alignment of masonry units starts with establishing of the wall lines. Other alignment methods include leveling, plumbing, racking, in-line alignment, and ensuring course height.

- Leveling

FIGURE 16



- Plumbing

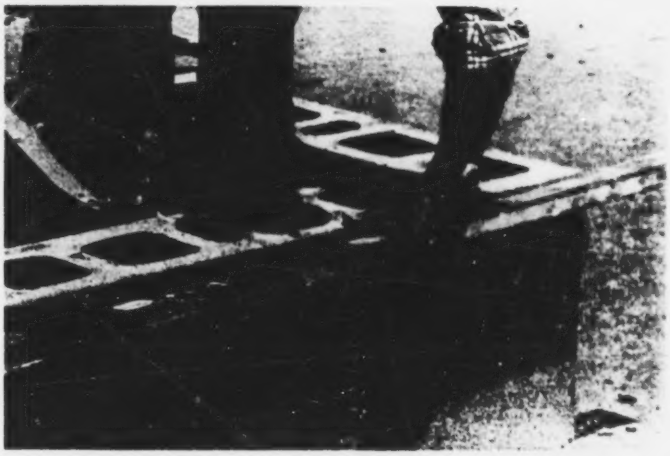
FIGURE 17

- Racking or tailing a lead

FIGURE 18

- Checking alignment (in-line)
  - With a straight edge

FIGURE 19



  - With a mason's line

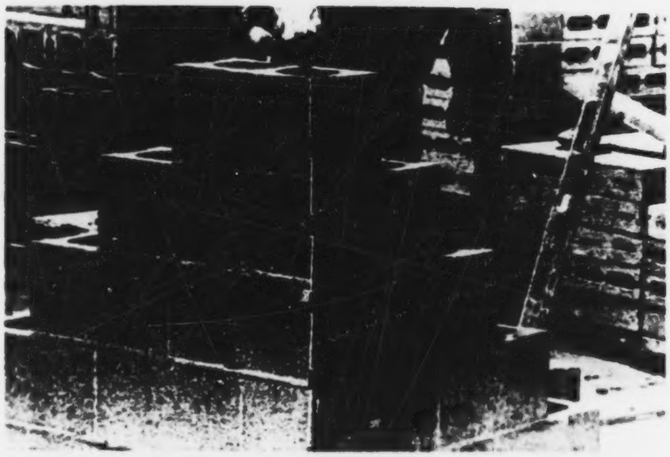
    Once the corner leads are constructed and aligned, a mason's line can be used to assist you in aligning each masonry unit of a course.

    NOTE: Several bricklayers may be laying masonry units simultaneously. Touching the mason's line in any way to cause movement is called "Thumping the line" and is very irritating to some bricklayers.

- Checking course height

  NOTE: A story pole is used to check course height.

FIGURE 20



- Striking mortar joints
    1. Once the mortar has partially cured, strike the joints.
    2. Use a jointer tool to strike the vertical joints and then the horizontal ones.
- Cleaning masonry units
    1. Use a trowel to scrape away any mortar that may have dropped on the masonry.
    2. Use a brush.
    3. Do *not* wash with water until the mortar fully sets.
    4. Consult the manufacturer's instructions before applying any other cleaning solvents. Some solvents can discolor brick and/or joints.
    5. Do *not* clean block with muriatic acid.

OBJECTIVE 4

Lay out and construct a section of masonry wall.

INTRODUCTION

This exercise is designed to provide you practical experience in the layout and construction of a section of masonry wall.

Several common hand tools are used during the exercise and your instructor will assist you in using these tools safely and effectively.

EQUIPMENT AND SUPPLIES

- Steel tape, 50- or 100-foot
- Bricklayer's modular rule
- Brick hammer and chisel
- Concave jointer
- Level, 4-foot
- Chalk line
- Mason's line
- Pencil
- Keel (marking crayon)
- Line pins and line block
- Dusting brush
- Safety glasses and hardhat
- Dust respirator
- 60 standard modular face brick
- 9 square-end concrete block, 8″ × 8″ × 16″
- 2 square-end concrete half block, 8″ × 8″ × 8″
- Laboratory mortar
- 5-gallon water pail and water
- Mortarboard

PROCEDURE

Functional Reading Skills
- Follow written instructions

General Science Skills
- Use scientific instruments (type)

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

Yes No

1. Study the plans for a masonry wall. ___ ___

FIGURE 21

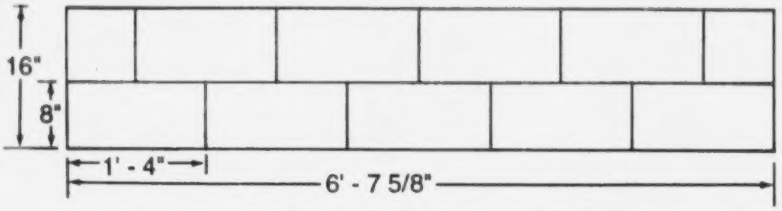
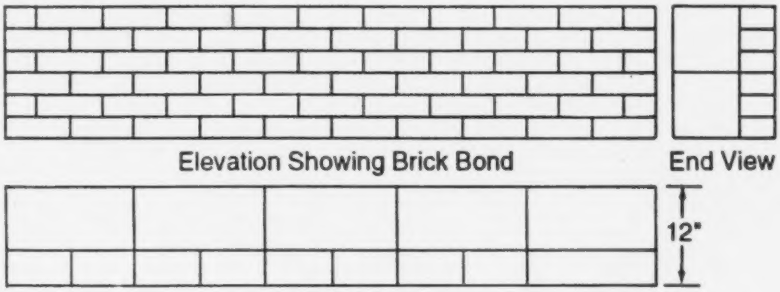


FIGURE 22



2. Put on hardhat and goggles. ___ ___

3. Establish wall line. ___ ___

NOTE: Some specifications call for the brick wall to be built first.

Yes No

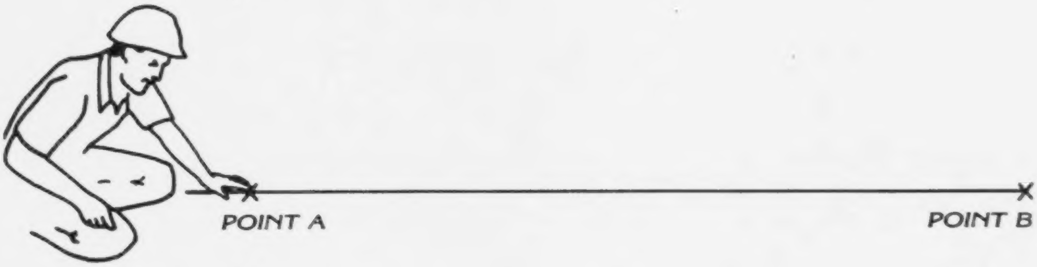
a. Locate known reference points. ___ ___

NOTE: You instructor, in a laboratory situation, should designate points for reference or starting points.

b. Snap a chalk line from point A to point B. ___ ___

This step establishes the exterior wall line.

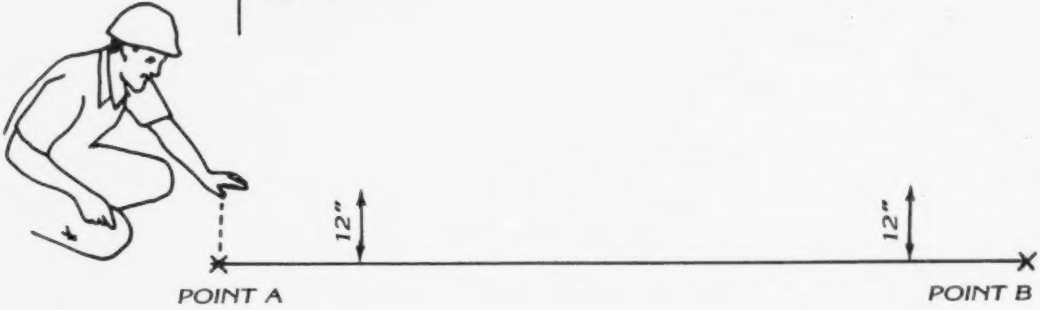
FIGURE 23



c. Establish interior wall line by measuring a distance of 12 inches from points A and B on exterior wall line and snap a chalk line. ___ ___

NOTE: The interior wall line should be parallel to the exterior wall line.

FIGURE 24



Yes No

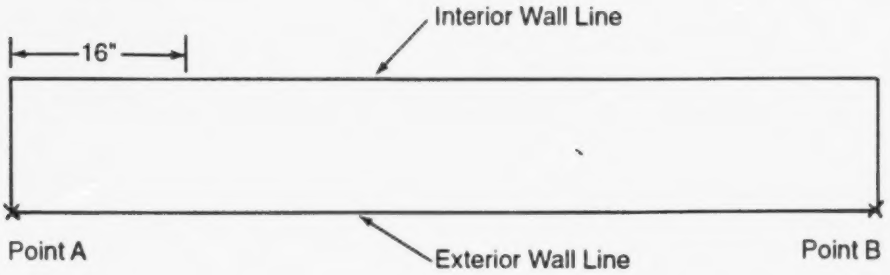
d. Establish both ends of wall by squaring end lines between interior and exterior wall lines at points A and B. ___ ___

e. Check wall lines for dimension accuracy. ___ ___

f. With steel tape, measure and mark every 16 inches on interior wall line. ___ ___

NOTE: These marks indicate the block bond.

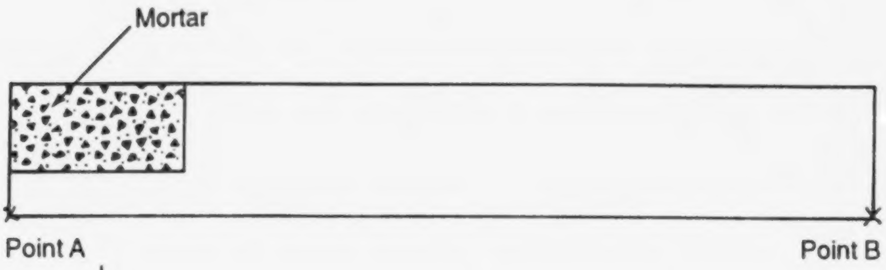
FIGURE 25



Yes No

g. Spread bed mortar for first block at point A end of wall. ___ ___

FIGURE 26



h. Pick up block and gently position it, keeping block straight with interior wall line and end line. ___ ___

i. Spread mortar and set second block at point B end of wall. These two blocks form a lead to which to align other blocks. ___ ___

j. Check course height with modular rule. ___ ___

4. Lay first course of block to the mason's line. ___ ___

NOTE: The first course of the wall is very critical. The block should be in proper alignment with wall line and be plumb, level, and square.

5. Lay second course of block to mason's line. ___ ___

	Yes	No
6. Check course height with modular rule.	___	___
7. Remove mason's line.	___	___
8. Lay out a dry bond for first course of brick.	___	___
9. Mark floor at end of each brick.	___	___
10. Remove dry bond.	___	___
11. Build leads for five more courses of brick.	___	___
12. Lay the courses of brick to the mason's line. Cut the brick as necessary.	___	___
13. Use a jointer tool to strike vertical and horizontal (head and bed) joints if necessary.	___	___
14. Brush wall after striking to remove mortar tags.	___	___
15. Tool joints to first-class finish.	___	___
16. Have instructor evaluate wall section.	___	___
17. Clean work area; clean and put away all tools and equipment.	___	___

OBJECTIVE 5 **Build a 90-degree brick lead.**

INTRODUCTION

This job sheet requires you to build a 90-degree brick lead using the layout knowledge acquired during this unit. The exercise expands your skills in using selected bricklaying techniques and tools.

EQUIPMENT AND SUPPLIES

- Bricklayer's modular rule
- Brick trowel
- Brick hammer
- 4-foot level
- Dusting brush
- Concave jointer
- Shovel
- Framing square
- Chalk line
- Mortarboard and stand
- Laboratory mortar
- 5-gallon bucket
- Water
- 21 face bricks
- Story pole
- Marking pencil

PROCEDURE

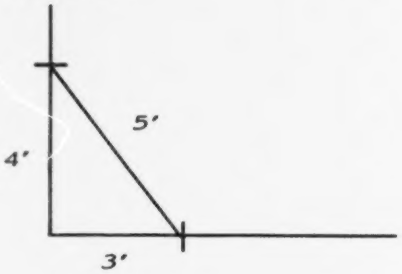
Functional Reading Skills
- Follow written instructions

General Science Skills
- Use scientific instruments (type)

Yes No

1. Put on your goggles and hardhat. ___ ___
2. Mark the wall lines. Your instructor should designate the starting point. ___ ___
3. Once marked, use the 3-4-5 method to check the squareness of chalk line. ___ ___

FIGURE 27

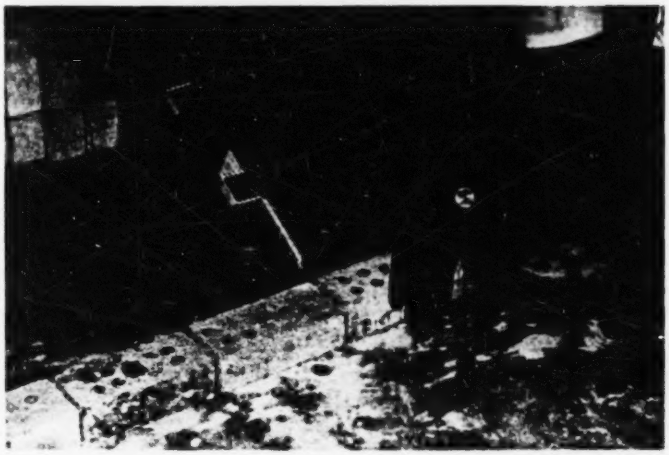


Job Acquisition/ Development Skills

- Master specific job task/procedure
- Practice good work habits/attitudes

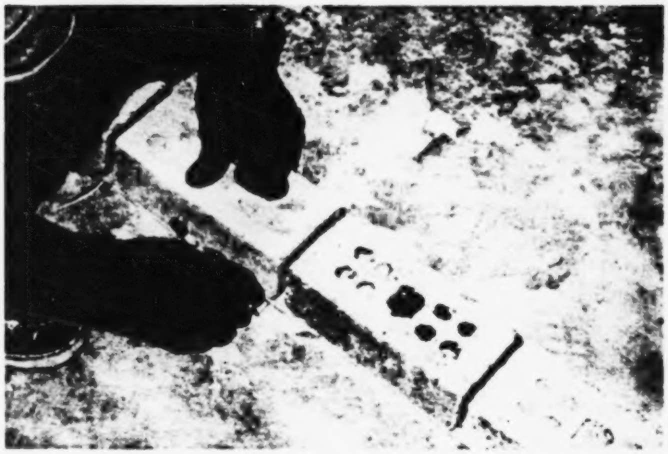
	Yes	No
4. Lay out dry bond for wall.	___	___

FIGURE 28



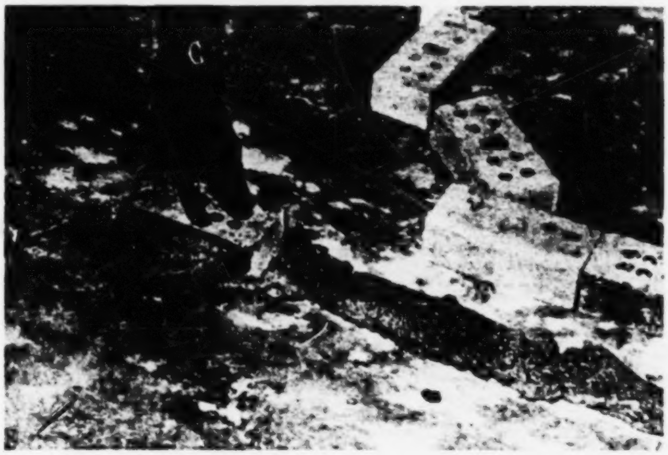
	Yes	No
5. Mark on floor location of ends of each brick.	___	___

FIGURE 29



	Yes	No
6. Remove dry bond by pushing bricks to outside so that you have enough room to lay corner leads.	___	___
7. Lay first course of bricks for a six-course lead.		
a. Spread enough bed mortar for three bricks.	___	___
b. Pick up full brick and press it firmly on mortar bed, leaving a ⅜-inch bed joint, and keeping face and end of brick even with chalk line on floor.	___	___

FIGURE 30

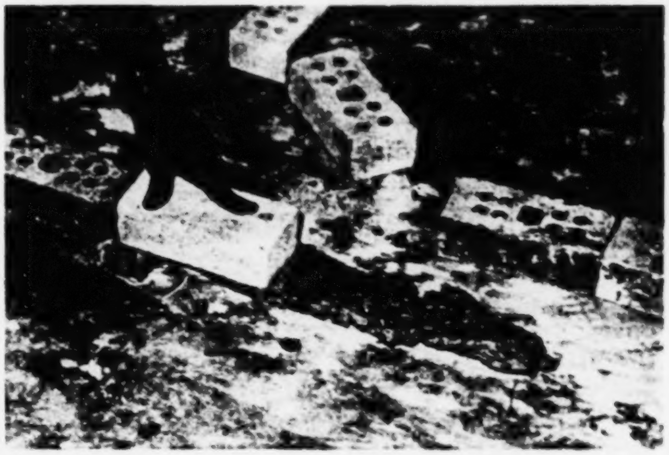


Yes No

c. Lay the two remaining bricks on lead by shoving brick into mortar and spreading enough mortar on end of brick to completely fill head joint. ___ ___

NOTE: Remove mortar at base of bricks and make sure that bricks are even with chalk line and with dry bond marks on the floor.

FIGURE 31

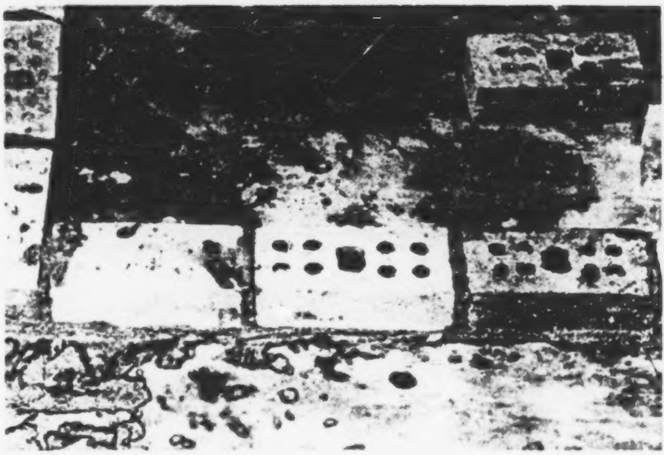


d. Spread mortar for three bricks at return of lead. ___ ___

e. Lay three bricks, keeping ⅜-inch bed joint and solid head joints. ___ ___

Yes No

FIGURE 32



f. Remove mortar at base of bricks. ___ ___

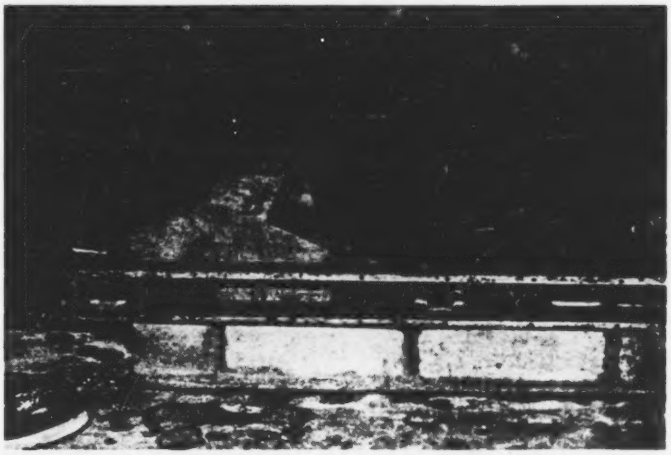
NOTE: Make sure to align face of bricks with chalk line on floor.

8. Set level on top of course laid, and check for levelness. ___ ___

NOTE: If brick course is not level, tap brick slightly with trowel handle at high end. (Figure 33)

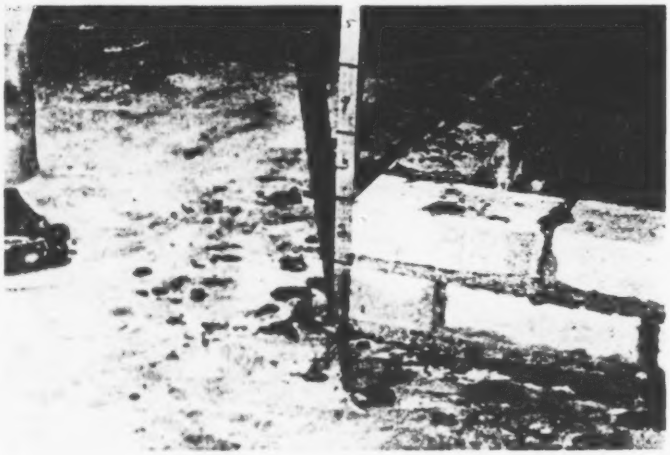
Yes No

FIGURE 33



9. Use story pole to check course height. ___ ___

FIGURE 34

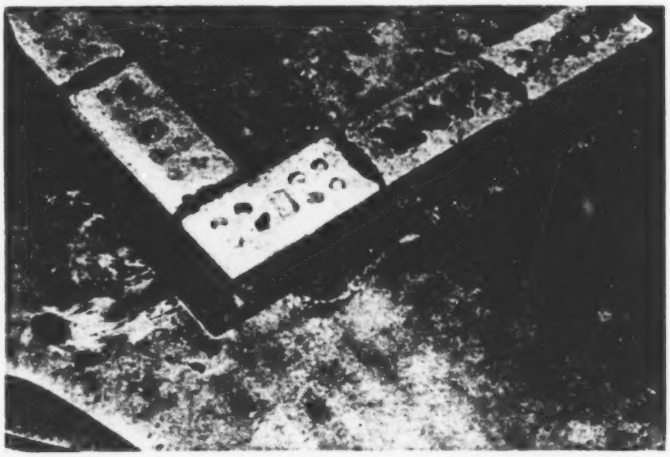


Yes No

10. Use framing square to check course squareness. ___ ___

NOTE: First course of lead should be flush with chalk lines and should be perfectly square.

FIGURE 35



11. Lay second course of lead.

    a. Spread mortar for three bricks in second course of lead. ___ ___

    b. Lay bricks, keeping ⅜-inch bed joint and solid head joints, and keeping face of brick even with brick face of first course. ___ ___

       Be careful not to smear or stain face of bricks when cutting mortar from bed and head joints.

Yes No

FIGURE 36

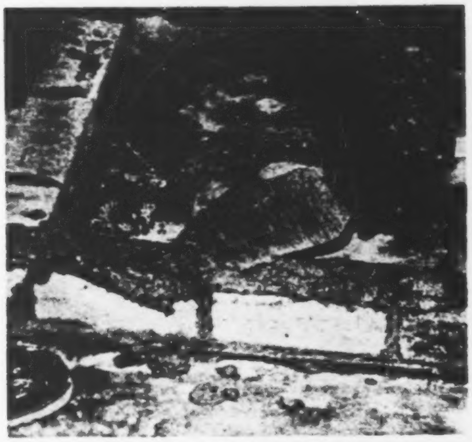
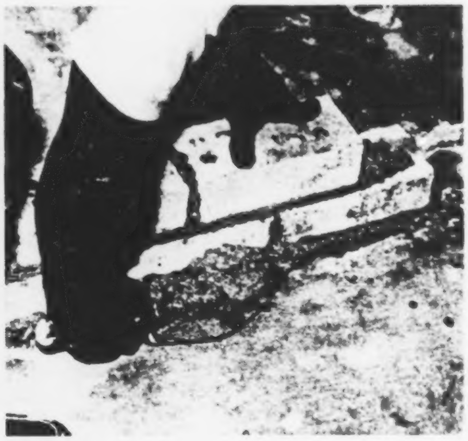


FIGURE 37



c. Spread mortar for two bricks in return of lead. ___ ___

d. Lay two bricks, keeping ⅜-inch bed joint and solid head joints. ___ ___

12. Level the course just laid; use story pole to check course height. ___ ___

Yes No

FIGURE 38

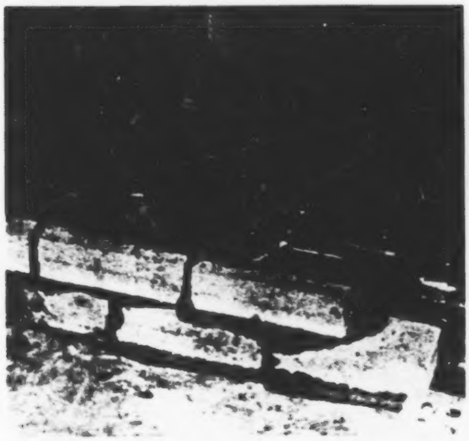
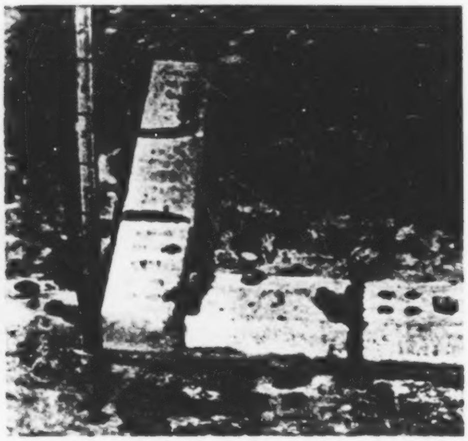


FIGURE 39



13. Plumb corners on lead with level, making sure that they are perfectly plumb. ___ ___

14. Lay third course.

    a. Spread mortar for two bricks for third course. ___ ___

    b. Lay bricks, keeping face of bricks even with face of bricks on second course. ___ ___

    c. Spread mortar for two bricks in return of lead; keep ⅜-inch bed joint and make sure that head joints are filled solid. ___ ___

15. Level course. ___ ___

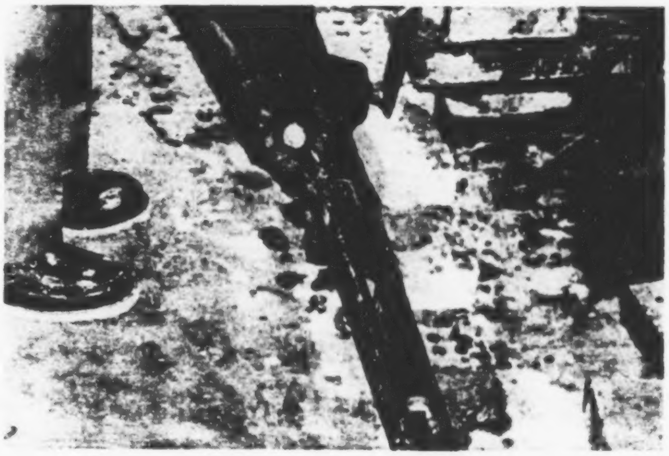
Yes No

16. Check course height with story pole. ___ ___

17. Plumb corners. ___ ___

18. Check range at both tails of lead. ___ ___

FIGURE 40



19. Lay remaining three courses of lead, using same procedures used to lay first three courses.

    a. Keep head joints filled solid. ___ ___

    b. Keep course level. ___ ___

    c. Check course height with story pole. ___ ___

Yes No

d. Make sure that corners are plumb and tails are on range. ___ ___

NOTE: For the last three courses on a lead, it is a good practice to sight the corner bricks that are going to be laid with the three courses that have been plumbed.

FIGURE 41

20. Have instructor inspect your work. ___ ___

21. Clean work area; clean and put away all tools and equipment. ___ ___

WRITTEN TEST

APPLIED SKILLS A 3

Name ______________________________ Score __________

OBJECTIVE 1

Given a list of terms associated with layout and application of skills for bricklaying, match them to their correct definitions.

_____ 1. A section of wall built up and racked back on successive courses is called a

a. guidepost
b. wall rack
c. lead
d. pattern

_____ 2. Another term to describe a wall that supports only its own weight is called a/an

a. bearing wall
b. non-load-bearing wall
c. lintel
d. loose wall

_____ 3. The process of remixing mortar to its proper consistency is

a. tempering
b. parging
c. mortar trim
d. flow mixing

_____ 4. What is the term used to describe the process of shaping or tooling mortar joints?

a. Dressing
b. Striking
c. Racking
d. Linteling

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_____ 5. Which of the following terms describe a continuous section of masonry *one unit* thick?

a. Rack
b. Bond
c. Wall keel
d. Wythe

_____ 6. The horizontal mortar joint between two units or courses is called

a. bed joint
b. closure
c. furrow bond
d. ferrule joint

_____ 7. The grooves within the sides of brick or block to strengthen bonding is called a/an

a. bond joint
b. closure
c. frog
d. cavity

_____ 8. A mixture of cement, aggregate, and water that has the consistency that allows it to flow easily is called

a. fill
b. pack
c. grout
d. silt

_____ 9. What is another name for a construction crayon?

a. Lead
b. Marker
c. Lintel
d. Keel

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_____10. What is a method used to determine brick spacing by laying brick without mortar?

a. Stack testing
b. Dry bond
c. Dry testing
d. Lead stack

_____11. The pattern in which bricks are laid is

a. a course
b. racking back
c. a block or brick lead
d. brick bond

_____12. The last unit laid in a course is the

a. closure
b. bed joint
c. lintel
d. head joint

_____13. The air space between two wythes is a

a. dead air space
b. cavity
c. through-wall vent
d. weep hole

_____14. A block to which the line is attached for lead or first course is called

a. lock
b. frog
c. deadman
d. head joint

_____15. The metal cap around the handle of brick trowel at the shank end is the

a. keel
b. ferrule
c. weep hole
d. furrow

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______16. The horizontal member places over all openings to support the weight of the masonry above is the

a. lintel
b. wythe
c. course
d. deadman

______17. The vertical mortar joint between two units is the

a. plumb
b. bed joint
c. head joint
d. frog

______18. Setting back the end of each course from the end of the preceding course is called

a. tempering
b. striking
c. leading
d. raking

OBJECTIVE 2 **Name methods of strengthening walls by joining the inner and outer wythes.**

______ 1. Which of the following methods can be used to strengthen walls?

a. Grout reversal
b. Header construction
c. Mason line suspension
d. Overhand method

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OBJECTIVE 3

Discriminate between proper and improper methods for laying brick and block.

_____ 1. What is the recommended method to establish wall lines?

a. Lay out the brick or block between the reference points.
b. Snap a chalk line between the reference points.
c. Use a steel tape to form two diagonal wall lines.
d. All the above.

_____ 2. What two methods can be used to establish brick or block *spacing*?

a. Dry bonding or using a steel tape to measure/mark the joint locations
b. Dry bonding or using a square to measure the wall width
c. Use a square or a steel tape to keep the wall lines parallel.
d. Use a steel tape to mark the joint locations or use a framing square to keep the wall lines parallel.

_____ 3. When using a trowel, what method is recommended to pick up mortar?

a. Cupping
b. Cutting
c. Slicing
d. Simplex

_____ 4. What is the suggestion direction of travel for a right-handed person placing mortar?

a. Spreads and places masonry units from right to left
b. Spreads and places masonry units from left to right as they move forward
c. Spreads and places masonry units from left to right as they move backwards
d. Spread and places masonry units from right to left as they move backwards

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_____ 5. What methods are used to align masonry units?

a. Leveling
b. Plumbing
c. Use mason's line
d. All the above

_____ 6. What method is used to check the height of a course(s)?

a. Leveling
b. Using a story pole
c. Racking
d. Using a mason's line

_____ 7. Which of the following methods are used to ensure each masonry unit of a course is aligned with the corner lead?

a. Plumbing
b. Snap a line
c. Use the overhand placement method
d. Use a mason's line

_____ 8. To clean masonry units

a. use water only after mortar sets
b. use a brush
c. use a trowel
d. all the above

NOTE: Objectives 5-6 are evaluated on job sheets in this unit. If you have not completed these components, see your instructor.

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OBJECTIVE 1

1. c
2. b
3. a
4. b
5. d
6. a
7. c
8. c
9. d
10. b
11. d
12. a
13. b
14. c
15. b
16. a
17. c
18. d

OBJECTIVE 2

1. b

OBJECTIVE 3

1. b
2. a
3. a
4. c
5. d
6. b
7. d
8. d

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) INTRODUCTION TO BRICKLAYING

UNIT NUMBER AND TITLE A 1 BRICKLAYING MATERIALS

TOTAL NUMBER OF TEST QUESTIONS 48

TOTAL NUMBER OF BASIC SKILL QUESTIONS 4

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	1, 3, 4-6, 8-10, 13-25	X
1	2, 7, 11, 12	S
2	1-15	X
3	1-5	X
4	1-3	X

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) INTRODUCTION TO BRICKLAYING

UNIT NUMBER AND TITLE A 2 — BRICKLAYING TOOLS

TOTAL NUMBER OF TEST QUESTIONS 34

TOTAL NUMBER OF BASIC SKILL QUESTIONS 0

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	1-9	X
2	1-20	X
3	1-5	X

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) INTRODUCTION TO BRICKLAYING

UNIT NUMBER AND TITLE A 3 – APPLIED SKILLS

TOTAL NUMBER OF TEST QUESTIONS 27

TOTAL NUMBER OF BASIC SKILL QUESTIONS 0

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	1-18	X
2	1	X
3	1-8	X

INTRODUCTION TO BRICKLAYING (Second Edition)
COMPETENCY PROFILE

Student ____ Soc. Sec. No. ______–______–______

Last First MI

PROGRAM

Grade 9 10 11 12 Adult

SCHOOL

INSTRUCTOR

SCHOOL ADDRESS

PHONE

STUDENT'S HOME ADDRESS

DATE OF BIRTH

PHONE

STUDENT'S EMPLOYER

ADDRESS

PHONE

CONTACT IN CASE OF EMERGENCY

PHONE

ADDRESS

OR

ADDRESS

PHONE

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DURATION OF EMPLOYMENT	JOB TITLE	EMPLOYER	SUPERVISOR'S NAME	ADDRESS OF EMPLOYER	PHONE

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DIRECTIONS: Evaluate the trainee using the rating scale below, and check the appropriate number to indicate the degree of competency. The numerical ratings of 4, 3, 2, 1, and 0 are not intended to represent the traditional school grading system of A, B, C, D, and F. The descriptions associated with each of the numbers focus on level of student performance for each of the tasks listed below.

Rating Scale:
4 — **Skilled** — can perform job independently with no additional training.
3 — **Moderately Skilled** — has performed job independently during the training program; limited additional training may be required.
2 — **Limited Practice** — has practiced job during training program; additional training is required to develop skill.
1 — **Exposure Only** — general information provided with no practice time; close supervision needed and additional training required.
0 — **No Exposure** — no information or practice provided during training program; complete training required.

UNIT A1

4	3	2	1	0	*Bricklaying Materials*
☐	☐	☐	☐	☐	1. Given a list of terms associated with bricklaying material, match them to their correct definitions.
☐	☐	☐	☐	☐	2. Provided drawings with dimensions, identify types of masonry building units.
☐	☐	☐	☐	☐	3. Provided drawings, select the names of popular masonry configurations and brick/block positions.
☐	☐	☐	☐	☐	4. Given a list of mortar types, match them to their characteristics.
☐	☐	☐	☐	☐	5. Identify reinforcement and hardware.
☐	☐	☐	☐	☐	6. ____________________

WRITTEN TEST SCORE ____________________

UNIT A2

4	3	2	1	0	*Bricklaying Tools*
☐	☐	☐	☐	☐	1. Given a list of terms associated with bricklaying tools, match them to their correct definitions.
☐	☐	☐	☐	☐	2. Provided drawings, identify types of hand tools used in bricklaying.
☐	☐	☐	☐	☐	3. Given illustrations, identify types of power tools used in bricklaying.
☐	☐	☐	☐	☐	4. Use a brick trowel correctly.
☐	☐	☐	☐	☐	5. Using common bricklaying hand tools, cut brick and block.
☐	☐	☐	☐	☐	6. Use a level.
☐	☐	☐	☐	☐	7. Use a brick spacing rule.
☐	☐	☐	☐	☐	8. ____________________

WRITTEN TEST SCORE ____________________

UNIT A3

4	3	2	1	0	*Applied Skills*
☐	☐	☐	☐	☐	1. Given a list of terms associated with layout and application of skills for bricklaying, match them to their correct definitions.
☐	☐	☐	☐	☐	2. Name methods of strengthening walls by joining the inner and outer wythes.
☐	☐	☐	☐	☐	3. Discriminate between proper and improper methods for laying brick and block.
☐	☐	☐	☐	☐	4. Lay out and construct a section of masonry wall.
☐	☐	☐	☐	☐	5. Build a 90-degree brick lead.
☐	☐	☐	☐	☐	6. ____________________

WRITTEN TEST SCORE ____________________

Use of This Document

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INTRODUCTION TO BRICKLAYING
(Second Edition)

READING SKILLS

UNITS OF INSTRUCTION	Reading Comprehension									Research and Reference								Functional Reading						Language		Compositio					
	Gain factual information	Distinguish fact, opinion and inference	Recognize stereotyping and bias	Recognize propaganda	Analyze cause and effect	Draw conclusions	Make generalizations	React to written material	Apply word analysis techniques	Select useful resources	Locate resources	Find materials in library	Use standard references	Use in-book reference tools	Use audiovisual media	Use computer data base	Use magazines and newspapers	Interpret forms and records	Follow written instructions	Interpret graphics and symbols	Use content area vocabulary	Interpret abbreviations/acronyms	Read aloud	Use standard grammar and correct spelling, punctuation, and capitalization	State ideas clearly	Use complete sentences	Develop preliminary outline	Use topic sentences	Use introductory/closing paragraphs	Compose reports	Compose essays
Bricklaying Materials																					●										
Bricklaying Tools																			●												
Applied Skills																			●												

CIMC BASIC SKILLS DOCUMENTATION M

WRITING SKILLS

MATH SKILLS

osition				Research					Functional Writing							Operation and Calculation														Math Application											Data Ana and Disp					
Compose reports	Compose essays	Proofread and edit	Construct graphics and symbols	Take notes	Use notecards	Create bibliography	Use footnotes	Outline material	Complete forms and records	Write instructions	Write letters	Write job applications	Write resumes	Use word processing	Use computer graphics	Round off numbers	Estimate answers	Use scientific notations	Use exponential notations	Calculate with whole numbers	Calculate with fractions	Calculate with decimals	Convert whole numbers to fractions	Convert whole numbers to decimals	Solve numerical expressions	Solve formulae and equations	Obtain squares and square roots	Convert units of measure	Perform metric calculations	Solve word problems	Select/apply mathematical formula	Select/apply mathematical procedure	Use English and metric measures	Solve time/rate/distance problems	Solve ratio/proportion problems	Solve percent problems	Apply techniques of scaling	Apply algebra principles	Apply geometry principles	Apply trigonometry principles	Interpret charts and tables	Interpret graphs (type)	Collect /record data	Apply sampling techniques	Apply principles of probability	Construct charts and tables
																				●	●																●		●							

MATRIX

SCIENCE SKILLS

94-010549

nalysis splay					Functional Math														General Science									Life Science							Physical Science					Earth Science							
Construct charts and tables	Construct graphs	Calculate statistics	Interpret statistics	Interpret blueprints/plans	Make measurements	Perform banking transactions	Make change	Solve practical problems	Calculate gross earnings	Solve income/expense problems	Prepare a budget	Calculate interest	Solve interest problems	Calculate sales tax	Determine income tax	Use calculator for computation	Use computer for computation	Use computer spreadsheets	Apply computing skills	Apply scientific method of inquiry	Conduct experiments	Investigate science ethics	Investigate science history	Investigate/apply economics in technology	Use scientific instruments	Investigate/apply technology	Collect specimens	Identify/classify living organisms	Investigate biological history of the earth	Investigate food chains, webs, pyramids	Investigate/apply principles of human development	Investigate/apply principles of genetics/heredity	Investigate/apply principles of anatomy/physiology	Investigate health issues	Analyze/classify matter	Investigate forms/changes of matter	Investigate forms/changes of energy	Investigate/apply chemical properties	Investigate/apply physical laws	Investigate physical characteristics of the earth	Investigate geological history of the earth	Investigate physical forces acting on the earth	Solve problems of longitude, latitude, and time zones	Investigate conservation of physical resources	Investigate conservation of living resources	Investigate issues of environmental impact	Apply science principles to environmental issues
																									●																						
				●	●																				●																						

	ORAL COMMUNICATION SKILLS																							INTERPERSO															
	Oral Presentation									Listening				Interactive Communication										General Relating															
UNITS OF INSTRUCTION	Make informative presentations	Make persuasive presentations	Present personal opinion/viewpoint	Use good speaking techniques	Select/use words effectively	Use effective body language	Present approriate appearance	Integrate audio and/or visual materials in oral presentations	Adapt presentation to specific audience	Apply active listening skills	Distinguish fact, opinion, and inference	Draw conclusions/make generalizations	Analyze/identify point of view	Give/follow oral directions	Apply questioning techniques	Conduct/receive interviews	Analyze/apply nonverbal communication	Work effectively in a group	Communicate with clients/customers/patients	Communicate with co-workers	Communicate with supervisors	Communicate with professional colleagues/associates	Apply telephone etiquette	Investigate/apply communication process models	Analyze/apply nonverbal communication	Investigate/apply cross-cultural communication	Interact with co-workers	Interact with supervisors	Interact with clients/customers/patients	Interact with professionalcolleagues/associates	Interact with family/friends	Participate in group activities	Participate in industrial relations/functions	Identify personal values/attitudes	Apply information to life experiences	Identify values/attitudes	Identify needs/drives	Select/apply appropriate behavior	Investigate/identify personal styles
Bricklaying Materials																																							
Bricklaying Tools																																							
Applied Skills																																							
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Select/apply appropriate behavior	Investigate/identify personal styles	Investigate/identify group/corporate climate	Give/receive feedback	Identify hidden purposes	Investigate/apply group dynamics	Control undesirable/inappropriate behavior	Resolve conflicts	Clarify goals/objectives	Devise "win/win" situations	Build consensus	Generate ideas	Present point of view	Analyze/apply leadership styles	Analyze/apply management styles	Obtain confidence of others	Develop esteem in self/others	Persuade others	Analyze/apply motivation techniques	Provide positive coaching	Collect/record information	Identify critical elements/issues	Define a problem	Identify underlying causes	Apply a problem-solving model	Analyze/synthesize information	Identify/analyze underlying assumptions	Draw conclusions	Predict results/outcomes	Identify/evaluate consequences	Identify/develop alternatives	Evaluate alternatives	Select an alternative	Devise a solution	Create a finished product	Apply intuitive/creative thinking processes	Transfer knowledge/training to new situations	Apply new technology	Develop an action plan	Evaluate results/outcomes	Analyze personal occupational aptitudes/preferences	Investigate employment prospects of a career field/occupation	Investigate training requirements for a career field/occupation	Investigate benefits of a career field/occupation	Compare/evaluate career options	Develop personal career path	Locate appropriate jobs	Analyze duties/requirements benefits of
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IPLOYABILITY SKILLS

SOCIAL STUDIES SKILLS

		Job Aquisition/ Development														Information Analysis						Social Studies Application										Functional Social Studies														
Locate appropriate jobs	Analyze duties/requirements/benefits of specific job	Master specific job task/procedure	Fill in job-related applications	Write letter of application	Write personal resume	Interview for a job	Apply business etiquette	Practice good work habits/attitudes	Develop good personal presentation	Develop self-confidence/esteem	Develop effective leadership	Deal effectively with supervisors	Deal effectively with co-workers	Deal effectively with professional colleagues/associates	Deal effectively with customers/clients	Collect/record data	Interpret graphical information	Construct graphical information	Interpret maps/globes	Interpret statistical information	Analyze/interpret demographic information	Investigate/apply U.S. history	Investigate/apply world history	Investigate/apply U.S. geography	Investigate/apply world geography	Investigate/apply principles of government/politics	Investigate/apply principles of economics	Investigate/apply principles of ethics	Investigate/apply principles of psychology	Investigate/apply principles of sociology	Investigate/apply cross-cultural studies	Practice responsible personal economics	Prepare a personal budget	Use credit responsibly	Practice good work ethics	Participate in industrial relations	Interact with people of different races/cultures	Investigate/participate in government	Investigate/apply American legal practices	Select/use sources of information on current events	Analyze current events	Analyze consumer issues	Analyze social issues	Analyze conservation/ecology issues	Analyze social impact of science/technology	Analyze economic impact of science/technology
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